TM 55-1520-202-20

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

ARMY MODELS
CH-34A AND CH-34C
AIRCRAFT

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HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1966

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *9 August 1966*

TM 55-1520-202-20, is published for the use of all concerned.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:
To be distributed in accordance with DA Form 12-31 (unclas) requirements for Organizational Maintenance Instructions for CH-34 aircraft.

*This manual supersedes TM 55-1520-202-20, 6 December 1963, including C 3, 29 July 1964, C 4, 30 October 1964, C 5, 5 March 1965, C 6, 16 June 1965, C 7, 21 July 1965, and C 8, 24 June 1966.

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CHAPTER 1

INTRODUCTION

Section I Scope

1—1. Purpose. This manual, issued expressly for organizational maintenance, is the official document for Army Model CH-34A helicopters, serial No. 54-2908, 54-2998, 54-3008, 54-3010, 54-3022, 54-3023; and Model CH-34C helicopters, serial No. 53-4475 through 53-4554, 54-882 through 54-937, 54-2860 through 54-2907, 54-2909 through 54-2914, 54-2995 through 54-2997, 54-2999 through 54-3007, 54-3009, 54-3011 through 54-3021, 54-3024 through 54-3050, 54-4462 through 55-4505, 56-4284 through 56-4315, 56-4317 through 56-4319, 56-4321 through 56-4342, 57-1685 through 57-1704, 57-1706 through 57-1723, 57-1727 through 57-1770, and 58-1721. The purpose of this manual is to supply organizational maintenance personnel with the maintenance functions to be performed at the second echelon maintenance level. A Table of Contents for this manual is provided to assist in determining the chapter in the manual in which individual functions are covered. The study and use of this manual will enable a maintenance crew of limited experience to perform the assigned functions with maximum efficiency. This manual provides all essential information for personnel to accomplish Army organizational maintenance on the complete airframe, its components, and systems with functions and related functions of the same general scope and magnitude, as prescribed for organizational maintenance activities in the Maintenance Allocation Chart. (Refer to Appendix II.)

Note

Do not destroy any pages in this manual unless the data contained thereon has been replaced, superseded, or included in the manual by a change or revision.

1—2. Distribution and Revisions. Distribution and revision of pages contained in this technical manual are accomplished in accordance with AR 310-1.

1—3. Notes, Cautions, and Warnings. Throughout this manual, reference is made to Notes, Cautions, and Warnings to emphasize important and critical instructions. The Notes, Cautions, and Warnings are used, as applicable, for the following conditions:

Note

An operating procedure, condition, etc, which is essential to highlight.

Caution

Operating procedures, practices, etc, which if not strictly observed, will result in damage to or destruction of equipment.

Warning

Operating procedures, practices, etc, which if not strictly observed, may result in personal injury or loss of life.

1—4. Authorization for Issue. Authorization for issue of this technical manual will be made in accordance with AR 310-3.

1—5. Requirements for Reporting Recommendations and Comments. The direct reporting of errors, omissions and recommendations for improving this manual by the individual user is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form may be completed using pen, pencil, or typewriter. DA Form 2028 will be completed by the individual using this manual and forwarded directly to: Commanding General, U. S. Army Aviation Materiel Command, ATTN: SMOSM-M, P. O. Box 209, Main Office, St. Louis, Missouri 63166.

Section II General Information

1-6. Scope. This organizational maintenance manual is divided into 16 chapters, 4 appendices, and an index. Each chapter, the appendices, and the index are described in the subsequent paragraphs.

1-7. Chapter 1 – Introduction. Chapter 1 notes the intent of this technical manual, signifies the responsibilities for distribution and revision, and outlines the requirements for reporting recommendations and comments on the information contained therein. Each chapter in the manual is briefly described and, in addition, general maintenance information is presented on ground handling methods, ground support equipment, servicing materials and instructions, electrical power loading chart, lubrication, and element effects on maintenance.

1-8. Chapter 2 – Lubrication Instructions. Chapter 2 provides general lubrication requirements, procedures and precautions, service schedules, and lubrication charts essential to accomplish complete lubrication on the CH-34A and CH-34C helicopters and their systems.

1-9. Chapter 3 – Inspection Requirements. Chapter 3 contains special and test flight inspection requirements and methods, specified inspection periods, and helicopter test flight inspection checksheets to assist organizational personnel in accomplishing inspection at specified intervals. Also included in this chapter are overhaul intervals and retirement schedules, for determining maximum authorized operating time of equipment and components of the helicopter, and standards and degrees of serviceability.

1-10. Chapter 4 – Airframe and Alighting Gear. Chapter 4 provides a detail and chronological description as to the method and procedures for organizational personnel to accomplish their assigned maintenance function on each item or major component of the complete airframe and alighting gear. Chapter 4 is divided into six sections, each of which pertains to a specific area of the helicopter structure.

1-11. Chapter 5 – Power Plant and Related Systems. Chapter 5 is divided into 10 sections, each of which discusses the individual systems comprising the power plant and related systems. Each section provides a description of the components and items comprising the system and furnishes complete maintenance instructions pertinent to the organizational level of maintenance.

1-12. Chapter 6 – Hydraulic and Pneumatic Systems. Chapter 6 contains a detailed description and maintenance procedures for each item of equipment or major component, and each unit thereof of the hydraulic system. Section III, the pneumatic system, is not applicable to the CH-34A and CH-34C helicopter.

1-13. Chapter 7 – Power Train System. Chapter 7 provides maintenance instructions on the main drive shaft, clutches, main transmission, tail rotor drive shaft, intermediate gear box, and tail rotor gear box. Each section provides a description of the components and items comprising the system and furnishes complete maintenance instructions applicable to the organizational level of maintenance.

1-14. Chapter 8 – Main and Tail Rotor Groups. Chapter 8 provides instructions on the main and tail rotor groups in accordance with the functions assigned to organizational maintenance personnel. This information includes a detailed description and chronological instructions as to methods and procedures.

1-15. Chapter 9 – Flight Controls. Chapter 9 provides all the essential information for maintenance personnel to accomplish organizational maintenance on the complete flight controls. This information includes detailed description and chronological instructions as to methods and procedures.

1-16. Chapter 10 – Instruments. Chapter 10 provides all the essential information on flight, navigation, engine, and miscellaneous instruments required by organizational maintenance personnel to perform their designated assignment.

1-17. Chapter 11 – Utility Systems. Chapter 11 is divided into nine sections, each of which discusses an individual utility system, as applicable on the CH-34 helicopter. Each section contains the essential information pertinent to a specific utility system and to organizational maintenance personnel.

1-18. Chapter 12 – Electrical Systems. Chapter 12 is divided into eight sections, each pertaining to different electrical systems applicable to the CH-34 helicopter. A complete set of wiring diagrams is included in this chapter to assist organizational and higher echelons of maintenance to perform their assigned maintenance functions.

1-19. Chapter 13 – Avionics and Photographic. Chapter 13 is not applicable to the CH-34 helicopter.

1-20. Chapter 14 – Armament. Chapter 14 is not applicable to the CH-34 helicopter.

Table 1–1. Ground support equipment

PART NO.	NOMENCLATURE	FIGURE 1–1 INDEX NO.	PROCURING SERVICE STOCK NO.
S1570-10616	Towbar, Motor Vehicle	1	1730-321-1028
S1570-21654	Assist Pole Fork (used with S1670-10506-4)	2	5340-631-3881
S1670-10051-1	Main Rotor Blade Rotator	3	5120-546-8557
S1670-10151-1	Hoisting Sling Assembly	4	
S1670-10449	Pylon Hoisting Sling	5	1730-555-4600
S1670-10481-25	Blade Stowage Assembly	6	1730-623-5920
S1670-10506-4	Assist Pole (used with S1670-10506-16)	7	1730-606-0193
S1670-10506-16	Blade Tiedown Cover Assembly	8	1730-712-1390

Table 1–2. Servicing materials

COMPONENTS	NOMENCLATURE	SPECIFICATION
Fuel System	Gasoline, Aviation	MIL-G-5572, *Grade 115/145
Engine Oil System	Lubricating Oil, Aircraft	MIL-L-6082, Grade 1100
Hydraulic System (Main Rotor Dampers, Primary Servo System, Auxiliary Servo System, Wheel Brake System, Main and Tail Landing Gear Shock Struts, and Main Rotor Brake Cylinder)	Hydraulic Fluid, Petroleum Base	MIL-H-5606
Main Rotor Dampers	Hydraulic Fluid, Petroleum Base	MIL-H-6083, Type I
Main, Intermediate, and Tail Rotor Gear Box	Lubricating Oil, Internal Combustion Engine, Preservation	MIL-L-21260, Grade 2
Rescue Hoist	Lubricating Oil, General Purpose	MIL-L-7870

*Use alternate grade 100/130 when grade 115/145 is not available.

OPERATING CONDITIONS

EQUIPMENT	NUMBER OF UNITS	AMPERES PER UNIT	OPERATING TIME — MIN	LOADING				START & WARMUP				TAXI				TAKEOFF & CLIMB			
				AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	15.0 MIN	AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	15.0 MIN	AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	15.0 MIN	AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	15.0 MIN
BASIC EQUIPMENT																			
PRIMARY BUS LOADS																			
FLIGHT INSTRUMENT																			
Pitot Heat Tube	1	4.0	30					4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turn & Slip	1	0.3	30	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Compass System	1	0.6	30	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
TOTAL				**0.9**	**0.9**	**0.9**	**0.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**
IGNITION																			
Vibrator Coil	1	2.9	0.5					2.9	2.9	0.7									
TOTAL								**2.9**	**2.9**	**0.7**									
ENGINE CONTROL																			
*Starter	1																		
Starter Relay	1	4.5	0.5					4.5	4.5	1.1	0.2								
Hydro-Mech Clutch	1	14.5	1.0					14.5	14.5	7.3	1.0								
TOTAL								**19.0**	**19.0**	**8.4**	**1.2**								
LIGHTING																			
Cockpit Dome Light	1	1.5	30	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Trouble Light	1	0.2	5.0	0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2	
Warning Light	7	0.2	1.0	1.4	1.4	0.7		1.4	1.4	0.7									
Instrument & Panel	73	0.04	30	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Oil Inspection Light	2	0.2	5.0	0.4	0.4	0.4													
TOTAL				**6.4**	**6.4**	**5.7**	**4.4**	**6.0**	**6.0**	**5.3**	**4.4**	**4.6**	**4.6**	**4.6**	**4.4**	**4.6**	**4.6**	**4.6**	**4.4**
MISCELLANEOUS																			
Servo (Primary) Valve	1	1.0						1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Servo (Auxiliary) Valve	1	1.0																	
Barrier Solenoid	1	1.0																	
Cargo Sling	1	18.0																	
TOTAL								**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
DC POWER																			
Battery Charging																57.6	57.6	36.0	21.6
Battery Relay	1	0.6	30	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Bus-Tie Relay	1	0.6	30	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Ext Pwr Relay	1	0.6	30	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6								
Ground Check Relay	1	0.2	30	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2								
Rev Current Cutout	1	0.5	30					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Gen Warn. Light Relay	1	0.2	30					0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Inverter Main	1	11.5	30	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Inverter Spare	1	11.5																	
TOTAL				**13.5**	**13.5**	**13.5**	**13.5**	**14.2**	**14.2**	**14.2**	**14.2**	**13.4**	**13.4**	**13.4**	**13.4**	**71.0**	**71.0**	**49.4**	**35.0**
FUEL & OIL																			
Eng Prm	1	0.6	0.5					0:6	0.6	0.2									
Oil Dil	1	0.3	5.0					0.3	0.3	0.3	0.1								
Fuel Pump Booster	1	10.0	30					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Fuel Pump (Transfer)	2	2.3	30					4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Fuel Control Unit	1	0.4	30					0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
TOTAL								**15.9**	**15.9**	**15.5**	**15.1**	**15.1**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**
WARNING & EMERGENCY																			
Fire Det Relay	1	Neg																	
Emergency Crew Alarm	1	0.5														0.5	0.5		
TOTAL																**0.5**	**0.5**		

EQUIPMENT	CRUISE				LANDING				CRUISE — MISSION				HOVERING			
	AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	30.0 MIN	AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	5.0 MIN	AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	30.0 MIN	AMP	AVERAGE AMP 0.5 MIN	2.0 MIN	30.0 MIN
BASIC EQUIPMENT																
PRIMARY BUS LOADS																
FLIGHT INSTRUMENT																
Pitot Heat Tube	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turn & Slip	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Compass System	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
TOTAL	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**	**4.9**
IGNITION																
Vibrator Coil																
TOTAL																
ENGINE CONTROL																
*Starter																
Starter Relay																
Hydro-Mech Clutch																
TOTAL																
LIGHTING																
Cockpit Dome Light	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Trouble Light	0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2	
Warning Light																
Instrument & Panel	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Oil Inspection Light																
TOTAL	**4.6**	**4.6**	**4.6**	**4.4**	**4.6**	**4.6**	**4.6**	**4.4**	**4.6**	**4.6**	**4.6**	**4.4**	**4.6**	**4.6**	**4.6**	**4.4**
MISCELLANEOUS																
Servo (Primary) Valve	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Servo (Auxiliary) Valve																
Barrier Solenoid																
Cargo Sling																
TOTAL	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
DC POWER																
Battery Charging	43.2	43.2	27.1	11.7	14.4	14.4	9.0	7.2	28.9	28.9	18.0	7.8	43.2	43.2	27.1	11.7
Battery Relay	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Bus-Tie Relay	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Ext Pwr Relay																
Ground Check Relay																
Rev Current Cutout	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Gen Warn. Light Relay	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Inverter Main	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Inverter Spare																
TOTAL	**56.6**	**56.6**	**40.5**	**25.1**	**27.8**	**27.8**	**22.4**	**20.6**	**42.3**	**42.3**	**31.4**	**21.2**	**56.6**	**56.6**	**40.5**	**25.1**
FUEL & OIL																
Eng Prm																
Oil Dil																
Fuel Pump Booster	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Fuel Pump (Transfer)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Fuel Control Unit	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
TOTAL	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**
WARNING & EMERGENCY																
Fire Det Relay																
Emergency Crew Alarm	0.5	0.5			0.5	0.5			0.5	0.5			0.5	0.5		
TOTAL	**0.5**	**0.5**			**0.5**	**0.5**			**0.5**	**0.5**			**0.5**	**0.5**		

*See Starting Load Characteristics (Sheet 4 of 5).

Figure 1–2. Electrical dc power loading chart (Sheet 1 of 5)

EQUIPMENT	NUMBER OF UNITS	AMPERES PER UNIT	OPERATING TIME — MIN	OPERATING CONDITIONS																															
				LOADING				START & WARMUP				TAXI				TAKE OFF & CLIMB				CRUISE				LANDING				CRUISE — MISSION				HOVERING			
					AVERAGE AMP				AVERAGE AMP				AVERAGE AMP				AVERAGE AMP				AVERAGE AMP				AVERAGE AMP				AVERAGE AMP				AVERAGE AMP		
				AMP	0.5 MIN	2.0 MIN	15.0 MIN	AMP	0.5 MIN	2.0 MIN	15.0 MIN	AMP	0.5 MIN	2.0 MIN	15.0 MIN	AMP	0.5 MIN	2.0 MIN	15.0 MIN	AMP	0.5 MIN	2.0 MIN	30.0 MIN	AMP	0.5 MIN	2.0 MIN	5.0 MIN	AMP	0.5 MIN	2.0 MIN	30.0 MIN	AMP	0.5 MIN	2.0 MIN	30.0 MIN
BASIC EQUIPMENT (Cont)																																			
PRIMARY BUS LOADS																																			
ENG INSTRUMENTS																																			
Carburetor Air Temp Indicator	1	0.04	30																																
Engine Oil Temp Indicator	1	0.04	30	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Transmission Oil Temp Indicator	1	0.04	30																																
Cylinder Head Temp Indicator	1	0.04	30																																
TOTAL				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
TOTAL PRIMARY BUS LOADS				21.0	21.0	20.3	19.0	64.1	64.1	50.2	41.0	39.1	39.1	39.1	38.9	97.2	97.2	75.1	60.5	82.8	82.8	66.2	50.6	54.0	54.0	48.1	46.3	68.5	68.5	57.1	46.7	82.8	82.8	66.2	50.6
SECONDARY BUS LOADS																																			
CONTROL SURFACE																																			
Magnetic Brake	2	1.5	30	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
TOTAL				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
HEAT & VENT																																			
Cabin Heater (50000 BTU)	1	20.4	30									20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
TOTAL												20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
LIGHTING																																			
Cabin Dome Light	2	1.5	30	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Radio Compartment Dome Light	1	1.5	30	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Landing Light Lamp	1	16.1	10									16.1	16.1	16.1	10.7	16.1	16.1	16.1	10.7					16.1	16.1	16.1	16.1					16.1	16.1	16.1	5.4
Landing Light Relay	1	0.2	10									0.2	0.2	0.2		0.2	0.2	0.2						0.2	0.2	0.2	0.2					0.2	0.2	0.2	
Trouble Light	1	0.2	5	0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	
Flasher	1	0.6	30									0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Fuselage (Fwd & Aft) Top Light	2	0.2	30									0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Fuselage (Bottom) Light	1	0.8	30									0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Pos (RH) Side Light	1	0.8	30									0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Pos (LH) Side Light	1	0.8	30									0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Tail Light	1	0.8	30									0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Cargo Flood Light	1	1.8	30																													1.8	1.8	1.8	1.8
Formation Light	2	0.2	30																																
Formation Light	1	0.2	30																	0.8	0.8	0.8	0.8					0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Formation Light	1	0.2	30																																
Rotating Light	1	3.8	30									3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
TOTAL				4.7	4.7	4.7	4.5	4.7	4.7	4.7	4.5	29.0	29.0	29.0	23.2	28.0	28.0	28.0	28.2	13.5	13.5	13.5	13.3	29.0	29.0	29.0	29.0	13.5	13.5	13.5	13.3	31.6	31.6	31.6	20.5
MISCELLANEOUS																																			
Windshield Wiper								5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
TOTAL								5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
TOTAL SECONDARY BUS LOADS				7.7	7.7	7.7	7.5	12.9	12.9	12.9	12.7	57.6	57.6	57.6	51.8	57.6	57.6	57.6	51.8	42.1	42.1	42.1	41.9	57.6	57.6	57.6	57.6	42.1	42.1	42.1	41.9	60.2	60.2	60.2	49.1
TOTAL PRIMARY BUS LOADS				21.0	21.0	20.3	19.0	64.1	64.1	50.2	41.0	39.1	39.1	39.1	38.9	97.2	97.2	75.1	60.5	82.8	82.8	66.2	50.6	54.0	54.0	48.1	46.3	68.5	68.5	57.1	46.7	82.8	82.8	66.2	50.6
TOTAL PRI & SEC BUS LOADS				28.7	28.7	28.0	26.5	77.0	77.0	63.1	53.7	96.7	96.7	96.7	90.7	154.8	154.8	132.7	112.3	124.9	124.9	108.3	92.5	111.6	111.6	105.7	103.9	110.6	110.6	99.2	88.6	143.0	143.0	126.4	99.7

ELECTRIC POWER EQUIPMENT: Generator (1) Type AN-3632-1, 30 VDC, 200 Amp, 3000-8000 RPM Gen to Eng Gear Ratio 2.2486:1. Battery (1) AN3150-2 VDC, 36 Amp hr Inverter (Main) AN3532-2, 115 VAC, 150 VA, 3φ, 400~. Inverter (Spare) AN3532-2, 115 VAC 250 VA, 3φ, 400~. Alternate Generator (1) AN3633-1, 30 VDC, 300 Amp; Alternate Battery (1) AN3150-2, 24 VDC, 36 Amp hr.

Figure 1—2. Electrical dc power loading chart (Sheet 2 of 5)

EQUIPMENT	NUMBER OF UNITS	AMPERES PER UNIT	OPERATING TIME — MIN	LOADING AMP	LOADING AVERAGE AMP 0.5 MIN	LOADING AVERAGE AMP 2.0 MIN	LOADING AVERAGE AMP 15.0 MIN	START & WARMUP AMP	START & WARMUP AVERAGE AMP 0.5 MIN	START & WARMUP AVERAGE AMP 2.0 MIN	START & WARMUP AVERAGE AMP 15.0 MIN	TAXI AMP	TAXI AVERAGE AMP 0.5 MIN	TAXI AVERAGE AMP 2.0 MIN	TAXI AVERAGE AMP 15.0 MIN	TAKEOFF & CLIMB AMP	TAKEOFF & CLIMB AVERAGE AMP 0.5 MIN	TAKEOFF & CLIMB AVERAGE AMP 2.0 MIN	TAKEOFF & CLIMB AVERAGE AMP 15.0 MIN	CRUISE AMP	CRUISE AVERAGE AMP 0.5 MIN	CRUISE AVERAGE AMP 2.0 MIN	CRUISE AVERAGE AMP 30.0 MIN	LANDING AMP	LANDING AVERAGE AMP 0.5 MIN	LANDING AVERAGE AMP 2.0 MIN	LANDING AVERAGE AMP 5.0 MIN	CRUISE — MISSION AMP	CRUISE — MISSION AVERAGE AMP 0.5 MIN	CRUISE — MISSION AVERAGE AMP 2.0 MIN	CRUISE — MISSION AVERAGE AMP 30.0 MIN	HOVERING AMP	HOVERING AVERAGE AMP 0.5 MIN	HOVERING AVERAGE AMP 2.0 MIN	HOVERING AVERAGE AMP 30.0 MIN
RADIO EQUIPMENT																																			
PRIMARY BUS LOADS																																			
RADIO (INSTALLED)																																			
*UHF Rcvr-Trans (AN/ARC-55)	1	15.8	30	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15:8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
FM Equipment (AN/ARC-44)	1	15.8	30	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
FM Equipment (AN/ARC-44)	1	1.4	**	1.4	1.4	0.7		1.4	1.4	1.4	0.3	1.4	1.4	1.4	0.3	1.4	1.4	0.7		1.4	1.4	1.4		1.4	1.4	0.7		1.4	1.4	1.4		1.4	1.4	1.4	0.3
LF Radio Compass (AN/ARN-6)	1	4.8	30																	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
LF-ADF (AN/ARN-59)	1	2.8	30	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Marker Beacon (AN/ARN-12)	1	1.5	30																	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Marker Beacon (AN/ARN-32)	1	0.59	30	0.59	0.59	0.59	0.59	0.59	0.59	0.59	9.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0:59
FM Homing (AN/ARA-31)																				0.6	0.6	0.6	0.6												
OMNI Receiver (R-11A)	1	3.1	30													3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
LF Receiver (R-11A)	1	1.5	30																	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
VHF Receiver (R-19)	1	1.5	30	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
VHF Transmitter (T-11B)	1	2.2	**	2.2	2.2	1.1		2.2	2.2	2.2	0.4	2.2	2.2	2.2	0.4	2.2	2.2	1.1		2.2	2.2	2.2	0.2	2.2	2.2	1.1	0.4	2.2	2.2	2.2	0.2	2.2	2.2	2.2	0.4
VHF Transmitter (T-13A)	1	2.2	**																																
RADIO (PROVISIONS)																																			
Directional Finder (AN/ARD-)	1	4.5	30																	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
ODR Receiver (AN/ARN-33)	1	5.2	30																	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Marker Beacon Rcvr (AN/ARN-35)	1	0.3	30																	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
IFF Transponder (AN/APX-30)	1	4.0	30																	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
SPECIAL EQUIPMENT																																			
PRIMARY BUS LOADS																																			
Glide Slope System (MN-100A)	1	1.1		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Inverter (500 VA)	1	37.0		26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
Inverter (750 VA)	1	42.5		31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0
ASE		7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0

*AN/ARC Type 12 (6 Amp Max & 2.8 Amp Standby) can be used as an alternate.
**See Supplementary Data Chart (Sheet 5 of 5).

Figure 1–2. Electrical dc power loading chart (Sheet 3 of 5)

STARTING LOAD CHARACTERISTICS

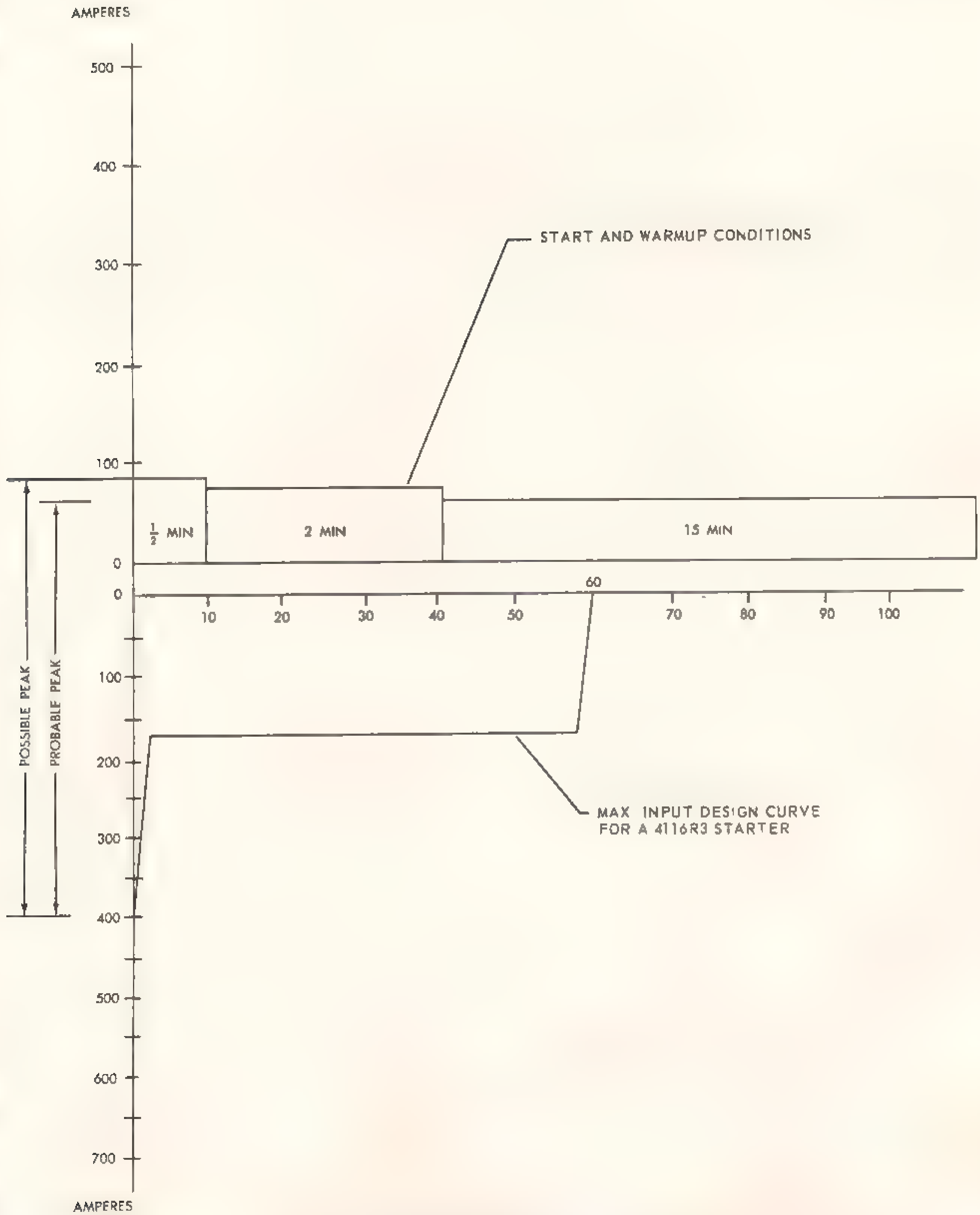


Figure 1–2. Electrical dc power loading chart (Sheet 4 of 5)

SUPPLEMENTARY DATA CHART

EQUIPMENT	LOADING	START & WARM-UP	TAXI	TAKEOFF & CLIMB	CRUISE	LANDING	CRUISE — MISSION	HOVERING
SERVO VALVES	EITHER PRIM. OR AUX SERVO OPERATED							
RADIO TRANSMITTING		1 MIN OPERATION PER 5 MIN	1 MIN OPERATION PER 5 MIN	1 MIN OPERATION PER 15 MIN	1 MIN OPERATION PER 10 MIN	1 MIN OPERATION PER 5 MIN	1 MIN OPERATION PER 10 MIN	1 MIN OPERATION PER 5 MIN
CREW ALARM				0.5 MIN	0.5 MIN	0.5 MIN	0.5 MIN	0.5 MIN
FIRE DET RELAY	MOMENTARY OPERATION							
BARRIER SOLENOID	MOMENTARY OPERATION							
SPARE INVERTER	11.5 AMP WHEN OPERATING							
CARGO SLING	MOMENTARY OPERATION							

Figure 1—2. Electrical dc power loading chart (Sheet 5 of 5)

EQUIPMENT	TOTAL NO. OF UNITS	OPERATING TIME IN MIN	ELECTRICAL REQUIREMENTS PER UNIT									PF	FREQ RANGE	CONNECTED LOAD			CONNECTED LOAD PER PHASE						FIRE COND	
			115 V 3φ			115 V 1φ			26 V 1φ								A GND		C GND		C — A		C — A	
			VA	WATTS	VAR	VA	WATTS	VAR	VA	WATTS	VAR			VA	WATTS	VAR	WATTS	VAR	WATTS	VAR	WATTS	VAR	WATTS	VAR
*NORMAL CONDITION																								
Inverter — Main	1	30	250 0									0.90	400											
Autotransformer	1	30							50 0				310-460											
Inverter Warning Light Relay	1	30				6 9	6.7	1 7				0 97	400	6 9	6 7	1.7					6 7	1.7	6 7	1 7
Transmission Oil Press Indicator	1	30							2 6	0 5	2 5	0 19	400	2 6	0 5	2 5			0 5	2 5				
Transmitter Oil Press Transmitter	1	30							5 3	1 1	5 2	0 21	400	5.3	1.1	5 2			1.1	5 2				
Engine Oil Press. Indicator	1	30							2 6	0 5	2 5	0 19	400	2 6	0 5	2 5			0 5	2 5				
Engine Oil Press Transmitter	1	30							5 3	1 1	5 2	0 21	400	10 6	2 2	10 4			2 2	10 4				
Fuel Press Indicator	1	30							2 6	0 5	2 5	0 19	400	2 6	0 5	2 5			0 5	2 5				
Fuel Press. Transmitter	1	30							5 3	1 1	5 2	0 21	400	5 3	1.1	5 2			1 1	5 2				
Prim & Aux Hyd Press Indicator	2	30							2 6	0 5	2 5	0 19	400	5 2	1 0	5 0			1 0	5 0				
Prim. & Aux Hyd Press Transmitter	2	30							5 3	1 1	5 2	0 21	400	10 6	2 2	10 4			2 2	10 4				
†Vertical Gyro Indicator — J-8	1	30	24 0	16 8	17 1							0 70	380-420	24 0	16 8	17 1	5 6	5 7	5 6	5 7	5 6	5 7	5 6	5.7
††Compass System J 2	1	30	32 0	18 3	27 3							0 57	400	32 0	18 3	27 3	6 1	9 1	6 1	9 1	6 1	9 1	6 1	9 1
Fuel Indicator	1	30				10 9	10 9	0 0				1 00	400	10 9	10 9	0 0	10 9	0 0						
Fire Det Control Unit	1	0 25				23 4	22 0	— 7 8				0 94	400	23 4	22 0	— 7 8							22 0	7 8
***Fire Det Control Unit	1	30				14 5	8 0	12 1				0 55	400	14 5	8 0	12 1					8 0	12 1	8 0	12 1
Relay — AC - DC	1	30				11 5	11 5	0 0				1 00	400	11 5	11 5	0 0					11 5	0 0	11 5	0 0
Load Resistor	1	30				21 0	21 0	0 0				1 00	400	21 0	21 0	0 0	21 0	0 0						
TOTAL (NORMAL CONDITION)				35 1	44 4		80 1	6 0		6 4	30 8	0 61			123 2	88 9	43 6	14 8	19 7	53 3	37 9	28 6	59 9	20 8
												0 81			VA — 152 0		VA — 46 0		VA - 56.8		VA — 47 5		VA — 63 3	
**EMERGENCY CONDITION																								
Inverter — Spare	1	30	250 0																					
Autotransformer	1	30							50 0															
TOTAL (SAME AS NORMAL CONDITION)				35 1	44 4		80 1	6 0		6 4	30 8	0 81			123 2	88 9	43 6	14 8	19 7	53 3	37 9	28 6	59 9	20 8
															VA — 152 0		VA — 46 0		VA — 56 8		VA — 47.5		VA — 63 3	

POWER SOURCE EQUIPMENT: MAIN INVERTER AN3532-2,250 VAC, 3φ 400~ (1 REQUIRED). SPARE INVERTER AN 3532-2,250 VA, 115 VAC, 3φ 400~ (1 REQUIRED). AUTOTRANSFORMER 70G/75,115 V/26 VAC 340-360~.

*Normal Operation: Main inverter supplies 3φ power to all AC equipment.
**Emergency Operation: Spare inverter supplies 3φ power to all AC equipment
***Fire Detector Control Unit requires 8 watts standby condition and 30 watts in fire alarm condition.
†Vertical Gyro Indicator — J-8 requires 30 VA per φ to start and 8 VA per φ to run
††Compass System — J-2 requires 130 VA to start and 32 VA to run

Figure 1-3. Electrical ac power loading chart (Model CH-34A)

EQUIPMENT	TOTAL NO. OF UNITS	OPERATING TIME IN MIN	ELECTRICAL REQUIREMENTS PER UNIT									PF	FREQ RANGE	CONNECTED LOAD			CONNECTED LOAD PER PHASE						FIRE COND	
			115 V 3φ			115 V 1φ			26 V 1φ								A — GND		C — GND		C — A		C — A	
			VA	WATTS	VAR	VA	WATTS	VAR	VA	WATTS	VAR			VA	WATTS	VAR	WATTS	VAR	WATTS	VAR	WATTS	VAR	WATTS	VAR
*NORMAL CONDITION																								
Inverter — Main	1	30	500.0																					
Autotransformer	1	30							50.0															
B-1A Indicator, K-4 Control	1	30	97.0	77.0	45.0							0.75	400	197.0	77.0	45.0	33.0	A O	10.0	15.0	34.0	26.0		
MN-100A Receiver	1	30				28.75	25.9	12.6				0.09	400	28.75	25.9	12.6			25.9	12.6				
Inverter Warning Light Relay	1	30				6.9	6.7	1.7				0.97	400	6.9	6.7	1.7					6.7	1.7	6.7	1.7
Transmission Oil Press Indicator	1	30							2.6	0.5	2.5	0.19	400	2.6	0.5	2.5			0.5	2.5				
Engine Oil Press Indicator	1	30							2.6	0.5	2.5	0.19	400	2.6	0.5	2.5			0.5	2.5				
XMSN Oil Press. Transmitter	1	30							5.3	1.1	5.2	0.21	400	5.3	1.1	5.2			1.1	5.2				
Engine Oil Press. XMTR	1	30							5.3	1.1	5.2	0.21	400	5.3	1.1	5.2			1.1	5.2				
Fuel Press. Indicator	1	30							2.6	0.5	2.5	0.19	400	2.6	0.5	2.5			0.5	2.5				
Fuel Press. XMTR	1	30							5.3	1.1	5.2	0.21	400	5.3	1.1	5.2			1.1	5.2				
Prim.& Aux Hyd Press. Indicator	2	30							2.6	0.5	2.5	0.19	400	5.2	1.0	5.0			1.0	5.0				
Prim & Aux Hyd Press. XMTR	2	30							5.3	1.1	5.2	0.21	400	10.6	2.2	10.4			2.2	10.4				
***Vertical Gyro Indicator, Copilot, J-8	1	30	21.0	16.8	17.1							0.70	380-420	24.0	16.8	17.1	5.6	5.7	5.6	5.7	5.6	5.7	5.6	5.7
****Compass, J-2	1	30	32.0	18.3	27.3							0.57	400	32.0	18.3	27.3	6.1	9.1	6.1	9.1	6.1	9.1	6.1	9.1
Fuel Indicator	1	30				10.9	10.9	0.0				1.00	400	10.9	10.9	0.0			10.9	0.0				
Fire Det. Control Unit	1	0.25				23.4	22.0	-7.8				0.94	400	23.4	22.0	—7.8							22.0	—7.8
Fire Det. Control Unit	1	30				14.5	8.0	12.1				0.55	400	14.5	8.0	12.1					8.0	12.1	8.0	12.1
Relay — AC-DC	1	30				11.5	11.5	0.0				1.00	400	11.5	11.5	0.0					11.5	0.0	11.5	0.0
ASE	1	30				109.0	77.1	77.1				0.707	380-420	109.0	77.1	77.1	77.1	77.1						
ASE	1	30	21.0	11.9	14.9							0.707	380-420	21.0	11.9	11.9	4.96	4.96	4.96	4.96	4.96	4.96		
Repeater Amplifier	1	30				58.2	53.7	19.9				0.925		58.2	53.7	19.9	53.7	19.9						
Load Resistor	1	30				44.1	44.1	0.0				1.0		44.1	44.1	0.0					44.1	0.0		
TOTAL (NORMAL CONDITION)												0.807			399.8	247.6	126.76	100.86	125.66	81.16	120.96	59.56	59.9	20.8
															VA=468.0		VA=166.0		VA=149.5		VA=135.0		VA=63.4	
**Emergency Condition																								
Inverter — Spare	1	30	500																					
Autotransformer	1	30																						
TOTAL (SAME AS NORMAL CONDITION)															399.8	247.6	126.76	100.86	125.66	81.16	120.96	59.56	59.9	20.8
															VA 468.0		VA 166.0		VA 149.5		VA −135.0		VA 63.4	

POWER SOURCE EQUIPMENT: MAIN INVERTER AN3533-1, 500 VA, 115 VAC, 3φ 400~ (1 REQUIRED) SPARE INVERTER AN3533-1, 500 VA, 115 VAC, 3φ 400~ (1 REQUIRED).

*Normal Operation: Main Inverter supplies 3φ power to all AC equipment.

**Emergency Operation: Spare Inverter supplies 3φ power to all AC equipment.

***Vertical Gyro Indicator Type J-8 requires 30 VA per φ to start and 8 VA per φ to run.

****Compass Type J-2 requires 130 VA to start and 32 VA to run

Figure 1–4. Electrical ac power loading chart (Model CH-34C)

1–37. Nonlubricated Bearings. Inspect bonded, seal-type bearings and self-aligned, ball-type bearings, without grease nipple (figure 1–5) for condition. These bearings cannot be relubricated and must be replaced as necessary.

1–38. Purging Grease-Lubricated Bearings. Grease-lubricated bearings, with fittings for gun application, should be purged when installed on a component, periodically as required, and when a condition demands purging. Purging removes accumulated dirt, water, and other foreign matter from the bearing and internal surfaces of the component containing the bearing. It also fills the bearing and internal cavities of the component with new grease which helps prevent corrosion. Once put into use, the bearing and component are cleaned of dirt particles that accelerate wear, water, or other foreign matter by purging.

1–39. Purging Precautions and Procedures. Grease pressure should be restricted at 1000 psi on bearings with integral seals to prevent blowing out seals. Grease pressure should be restricted at 6000 psi on bearings with separate seal arrangement which allows easy grease passage. Some plain (sleeve-type) bearings require 8000 psi. If more than 8000 psi is required, check fitting to ensure it is not plugged. Determine the cause of blockage and correct the deficiency. Excessive pressure created by lack of grease escapage can cause damage or failure to many components. The following steps will aid in purging and identifying a properly purged bearing:

Caution

Do not exceed recommended grease pressure. Grease nipples and nozzles must be cleaned before applying grease gun.

a. Rotate bearing slowly, to greatest possible extent, during purging to allow flow of grease to be well distributed. In some cases, when grease discharges in a small stream, greater distribution can be achieved by restricting stream with a flat implement.

Note

When bearing is purged properly, new, clean grease will discharge around full circumference of bearing. Any bearing which cannot be properly purged may still be operated, but should be disassembled and cleaned at earliest opportunity, especially if bearing is rough.

b. If sealed bearing seals have a tendency to blow out of assembly during purging, use a flat-shaped tool to hold seals in place.

c. Fasten a bearing lubrication adapter to shielded bearings (figure 1–5) to allow use of a normal gun tip.

d. Thoroughly purge new or stored equipment before use.

1–40. Repacking Sealed Bearings. All sealed bearings, including sealed, steel band-type rod end bearings and rubber-sealed bearings (figure 1–5), require periodic repacking with grease. Rotating bearings (360 degrees), especially those operating at high speeds, are normally packed one-third full since excess grease contributes to bearing temperature rise. Oscillating bearings are normally packed full of grease to prevent corrosion due to fretting and moisture. Bearings which have been idle for 2 years or more require repacking before use. In many installations, snap rings and seals may be removed from bearings without disassembling components to allow repacking. Remove split metal snap ring by inserting a suitable tool, such as a screw-

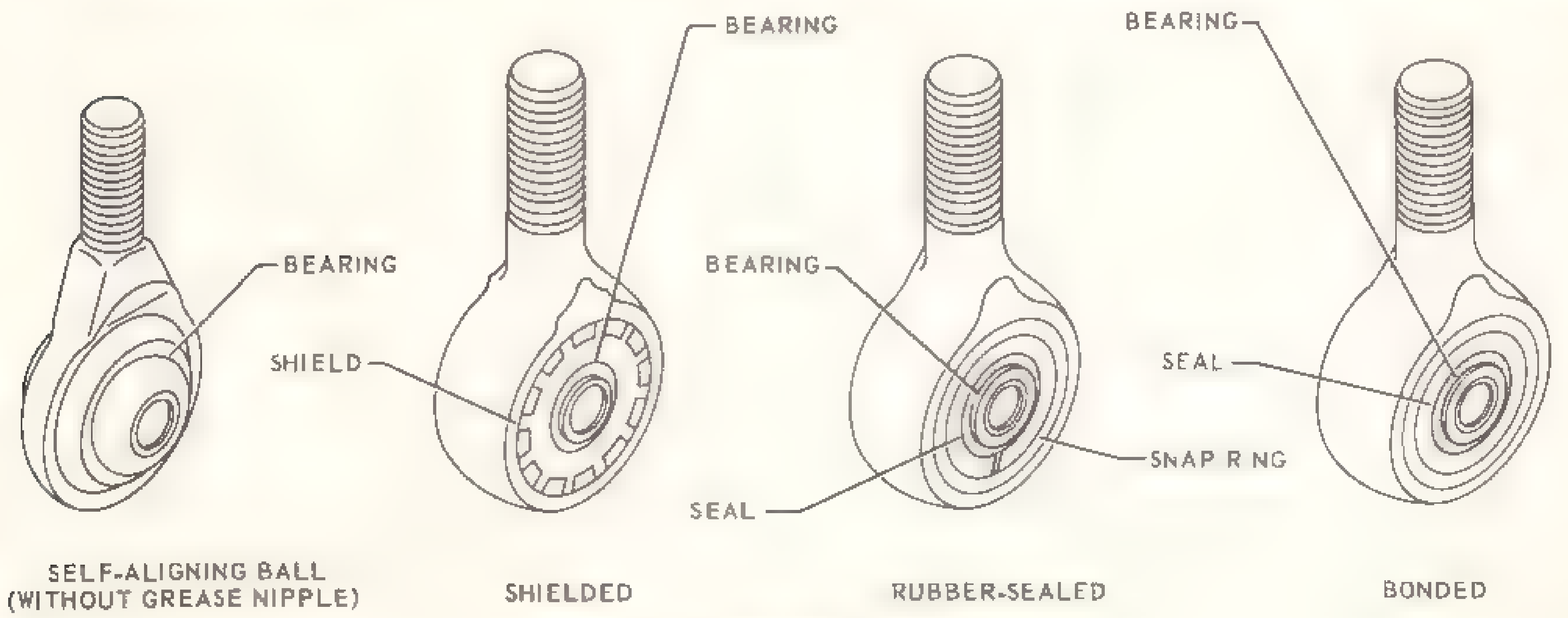


Figure 1–5. Identification of bearing seals

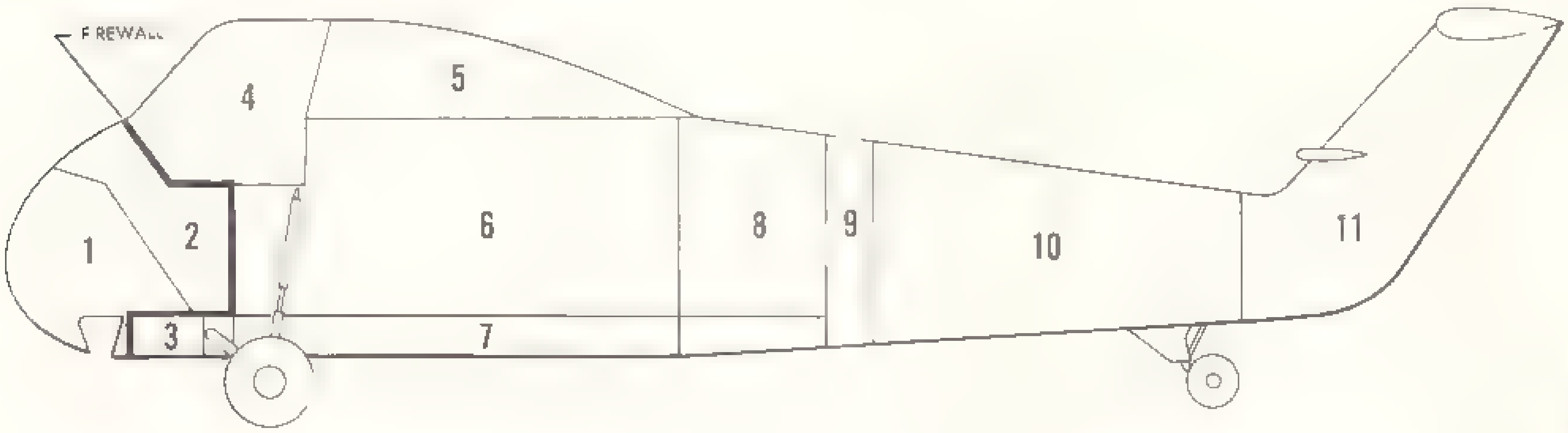
driver, between washer and rubber seal. A gentle twist or lift of tool will force one end of snap ring from groove. Grasp free end and carefully peel snap ring out of groove. Reverse peeling motion to restore snap ring in position. Place screwdriver in diagonal slot and twist. Snap ring will seat in groove. Care must be exercised to avoid damage to rubber seal. In some cases where bearings are not readily available for seal removal, they can be reached with a hypodermic needle from which grease can be pumped. This allows grease replenishment, but does not provide for periodic cleaning of the bearings.

Section III Aircraft General

1–41. Description. The Models CH-34A and CH-34C helicopters are single engine, single main rotor, and vertical antitorque tail rotor type helicopters designed for transportation of personnel and cargo. The fuselage is of semimonocoque design of magnesium alloy and aluminum alloy construction. The fuselage is divided into three major sections, the forward section, the tailcone section, and the pylon section. (See figure 1–6.) The forward section contains the following from front to rear: Engine compartment, clutch compartment, oil cell compartment, cockpit, transmission compartment, cabin, fuel tank compartment, electronics compartment, and heater compartment. Fuel is carried in 11 cells beneath the cabin floor. The cockpit contains a pilot's seat on the right and a copilot's seat on the left. The cabin accommodates 18 passengers or eight litters. The tail cone section supports the pylon and contains a catwalk to provide access to the tail rotor drive shaft. The pylon supports the tail rotor and stabilizer and is hinged to the tailcone. The pylon can be folded forward along the left side of the tailcone. The main rotor blades can be folded back along the tailcone. Dual flight controls are installed in the cockpit for use by the pilot and a copilot. Each set of controls consists of a cyclic pitch stick, a collective pitch stick, and tail rotor control pedals. Direction of flight and lift is provided by the main rotor; directional stability and control of the heading of the helicopter are provided by the tail rotor. The engine is adapted to be installed facing aft and inclined upward. The transmission system, which includes a hydromechanical clutch, transmits power from the engine to the rotors. Flight and engine instruments are located on the instrument panel in front of the pilot. The nonretractable landing gear includes two main wheels and a single tail wheel. A conventional 28-volt dc system furnishes the electrical power for the helicopter, and inverters supply ac current where required. Radio equipment provides air-to-air and air-to-ground communication and navigational information.

1–42. Helicopter Dimensions. The principal dimensions of the helicopter are shown in figure 1–7 and listed in table 1–3.

1–43. Station and Water Lines. For reference purposes, the length of the helicopter is divided into stations and the height is divided into water lines. If the station and water line of a particular part are



1. Engine compartment
2. Clutch compartment
3. Oil cell compartment
4. Cockpit
5. Transmission compartment
6. Cabin
7. Fuel tank compartment
8. Electronics compartment
9. Heater compartment
10. Tail cone
11. Pylon

Figure 1–6. Interior arrangement of compartments

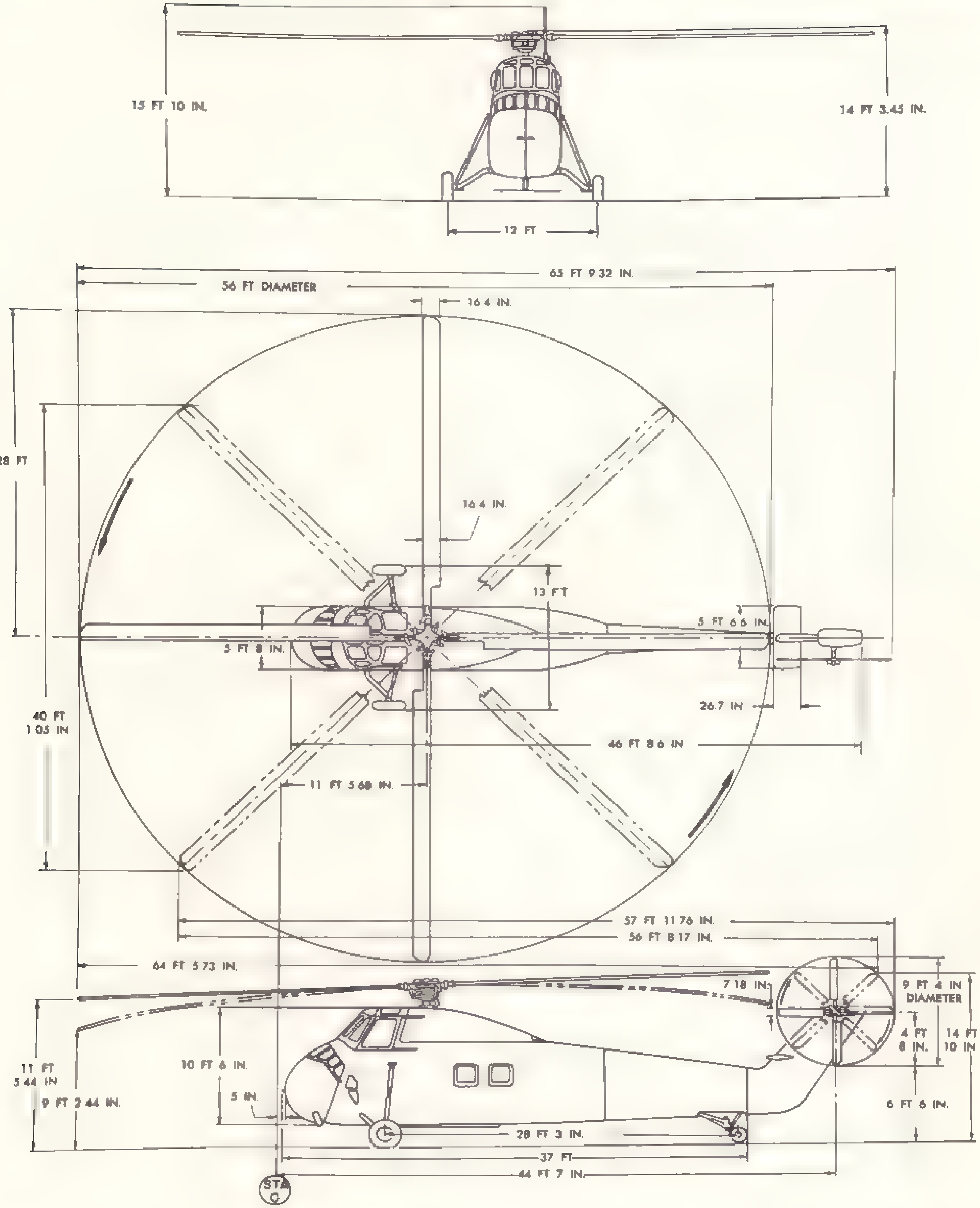


Figure 1—7. Three-view dimensions diagram

Table 1—3. Helicopter dimensions (Sheet 1 of 2)

GENERAL	
Main Rotor Disc Diameter	56 ft
Tail Rotor Disc Diameter	9 ft 4 in.
Design Gross Weight	12068 lb
Maximum Alternate Gross Weight	*13300 lb **13600 lb
WIDTH (overall)	
Maximum (With Rotors Stationary)	56 ft
Minimum (With Rotors Stationary)	
Minimum (With Blades Folded)	13 ft
LENGTH (overall)	
Maximum (Both Rotors at Extreme Positions)	65 ft 9.32 in.
Minimum (Both Rotors at Minimum Positions)	56 ft 8.17 in.
Minimum (Main Rotor at Minimum Position; Tail Rotor at Extreme Position)	57 ft 11.76 in.
Minimum (Main Rotor at Maximum Position; Tail Rotor at Minimum Position)	64 ft. 5.73 in.
HEIGHT	
Maximum (Tail Rotor at High Position)	15 ft 10 in.
Minimum (Tail Rotor at Low Position)	14 ft 10 in.
Minimum (Tail Rotor Removed)	14 ft 3.45 in.
MAIN ROTOR BLADES	
Number of Blades	4
Airfoil Section (Curve Identification)	NACA 0012
Chord at Root	16.4 in.
Chord at Tip	16.4 in.
Blade Radius	28 ft
Total Blade Area (Four Blades)	140 sq ft
Area Per Blade	35 sq ft
Area of Rotation (Rotor Disc Area)	2460 sq ft
Rotor Solidity (Total Blade Area Divided by Disc Area)	0.0568
Ground Clearance (Static)	9 ft 7.42 in.
Ground Clearance (Turning) Maximum	11 ft 5.44 in.
TAIL ROTOR BLADES	
Number of Blades	4
Airfoil Section	NACA 0012
Chord at Root	7.18 in.
Chord at Tip	7.18 in.
Blade Radius	4 ft 8 in.
Total Blade Area (Four Blades)	1372 sq in.
Area Per Blade	343 sq in.
Area or Rotation (Rotor Disc Area)	9847 sq in.
Rotor Solidity (Total Blade Area Divided by Disc Area)	0.1393
Ground Clearance (Static)	6 ft 6 in.
Ground Clearance (Turning)	6 ft 6 in.

Table 1–3. Helicopter dimensions (Sheet 2 of 2)

STABILIZER	
Number	1
Length	5 ft 6.6 in.
Area	12.38 sq ft
Airfoil	NACA 0009
FUSELAGE (Without Main and Tail Rotor Blades)	
Width (With Landing Gear)	13 ft
Width (Without Landing Gear)	5 ft 8 in.
Height (Without Landing Gear)	10 ft 6 in.
Length	46 ft 8.6 in.
Door Dimensions (Cargo)	4 ft 5.5 in by 4 ft
Height of Door Level Above Ground	2 ft 10.5 in.
Total Cubic Feet of Storage Space Available	457 cu ft (approx)

*Helicopters Serial No. Prior to 57-1685
**Helicopters Serial No. 57-1685 and Subsequent

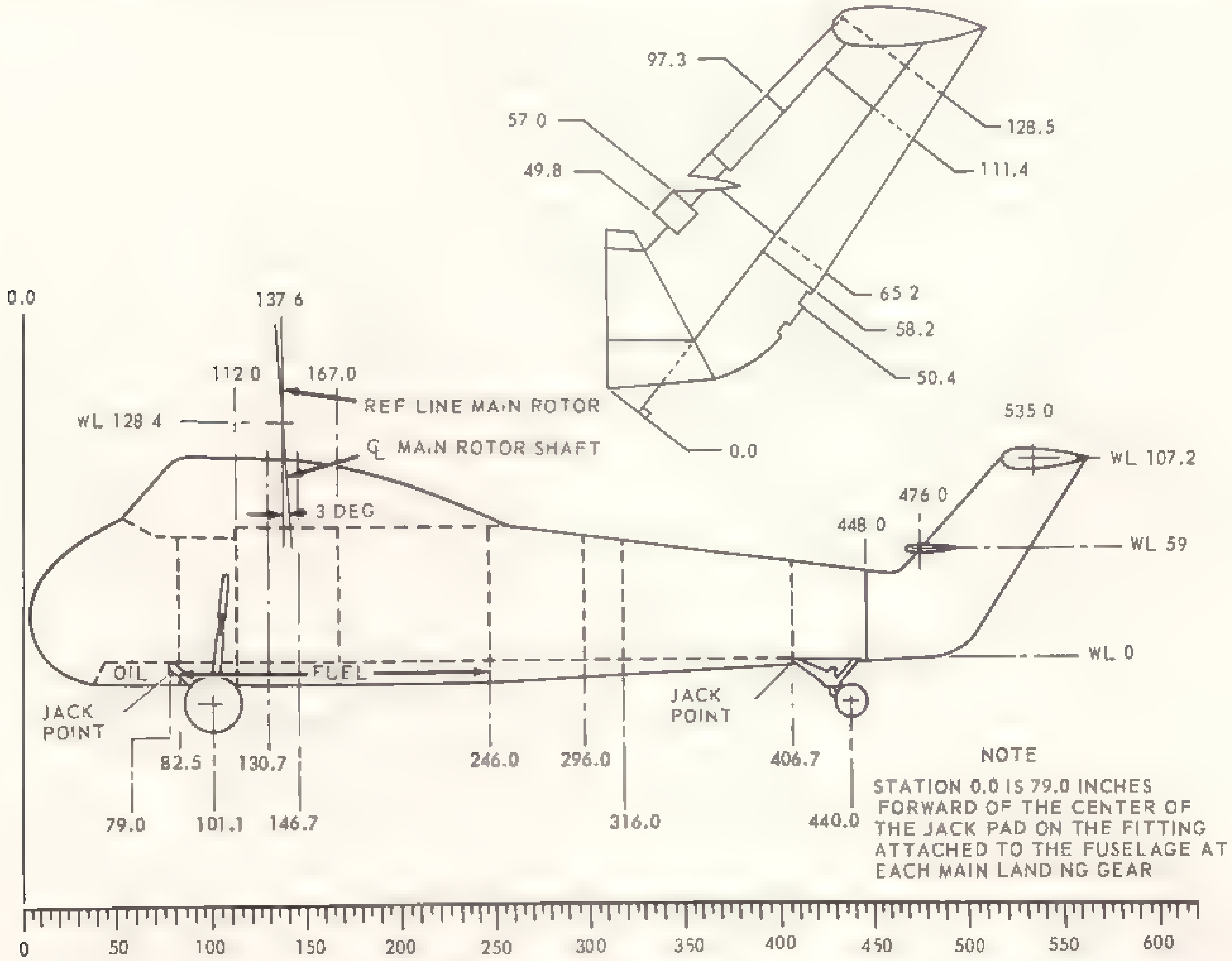


Figure 1–8. Station location diagram

known, their location on the helicopter can easily be determined by referring to figure 1–8.

Note

Readily accessible points from which measurements may be taken to determine station locations are the cabin forward bulkhead (station 82.5), the jack pad (station 79.0) on the main landing gear fitting on the bottom structure, and the jack pad (station 406.7) on the tail landing gear fitting on the bottom of the tailcone.

1–44. Access and Inspection Provisions. All access and inspection provisions on the helicopter are shown in figure 1–9.

1–45. Ground Handling. Ground handling covers all essential information concerning the handling and movement of the helicopter while on the ground. This includes hoisting, jacking, leveling, mooring, installing protective covers and shields, anti-icing and deicing, parking, and towing. The following paragraphs give, in detail, the instructions and precautions necessary to accomplish organizational maintenance functions.

1–46. Hoisting Helicopter. (See figure 1–10.) The helicopter is hoisted at four eyebolts, located on top of the upper plate of the main rotor hub assembly. To hoist, proceed as follows:

a. Connect hoisting sling assembly to eyebolts by means of quick-release pins.

b. Attach guide lines on mooring fittings on fuselage to guide helicopter during hoisting operations.

c. Using suitable hoist, accomplish hoisting operations. After completion of hoisting operations, disconnect guide lines and hoisting sling assembly.

Caution

Do not hoist the helicopter in unsheltered areas, except in calm weather.

1. Top Fairing Grill
2. Tail Rotor Gear Box Oil Level Window
3. Tail Rotor Gear Box Fairing Cover
4. Stabilizer Fairings
5. Disconnect Shaft and Intake Fairing
6. Tail Rotor Drive Shaft Covers
7. Louvered Fairing
8. Skin Assemblies
9. Fairing
10. Service Platform Door
11. Service Platforms
12. Main Gear Box Screen
13. Overhead Control Panel
14. Sliding Windows
15. *Auxiliary Servo and Mixer Covers
    **Automatic Stabilization Equipment Motor Box Covers
16. Radio Circuit Breaker and Fuse Panel Door
17. Cockpit Canopy
18. Nose Doors
19. Oil Filler Door
20. ****External Power Receptacle Door
21. Fuel Tank Filler Caps
22. Main Drive Shaft Tunnel Extension Cover
23. Cargo Door
24. Emergency Hatches
25. ***External Power Receptacle Door
26. Intermediate Gear Box Oil Level Window
27. Drain Plug Door
28. Intermediate Gear Box Panel
29. Support Bearing Panel
30. Tail Rotor Drain and Upper Rudder Coupling Panel
31. Fuel Lines Plates
32. Fuel Sump and Cell Fitting Covers
33. Fuel Selector Valve and Strainer Panel
34. Engine Support Fitting Access Cover
35. Engine Air Cooling and Oil Cell Opening
36. Emergency Fuel Lines Fairing
37. Tail Cone Opening
38. Electronics Compartment Opening
39. Pilot's Seat
40. Copilot's Seat
41. Servo Reservoir Inspection Window
42. Cockpit Opening
43. Main Drive Shaft Tunnel Cover
44. Clutch Access (Carburetor Induction Heat) Door
45. Cockpit Ladders
46. Auxiliary Servo Oil Level
47. Battery Box Cover
48. Circuit Breaker and Fuse Panel Cover
49. Inverter Panel
50. Right Engine and Clutch Compartment Floor
51. Right Oil Cell Cover
52. Fuel Selector Valve and Strainer Door
53. Forward Fuel Cell Access Covers (Forward Tank)
54. Forward Fuel Tank Filler
55. Aft Fuel Cell Covers (Forward Tank)
56. Aft Cabin Floor Panel (Forward Tank)
57. Center Tank Fuel Cell Access Covers
58. Center Cabin Floor Panel
59. Center Fuel Tank Filler
60. Aft Tank Fuel Cell Access Covers
61. Aft Fuel Tank Filler
62. Electronics Compartment Floor
63. Electronics Compartment Floor Access Covers
64. Aft Cabin Floor Panel
65. Observation Window Access Door
66. Forward Cabin Floor Panel (Forward Tank)
67. Left Oil Cell Cover
68. Left Engine and Clutch Compartment Floor

*Model CH-34A
**Model CH-34C
***Helicopters Serial No. Prior to 56-4313
****Helicopters Serial No. 56-4313 and Subsequent

Figure 1–9. Access and inspection provisions (Sheet 1 of 2)

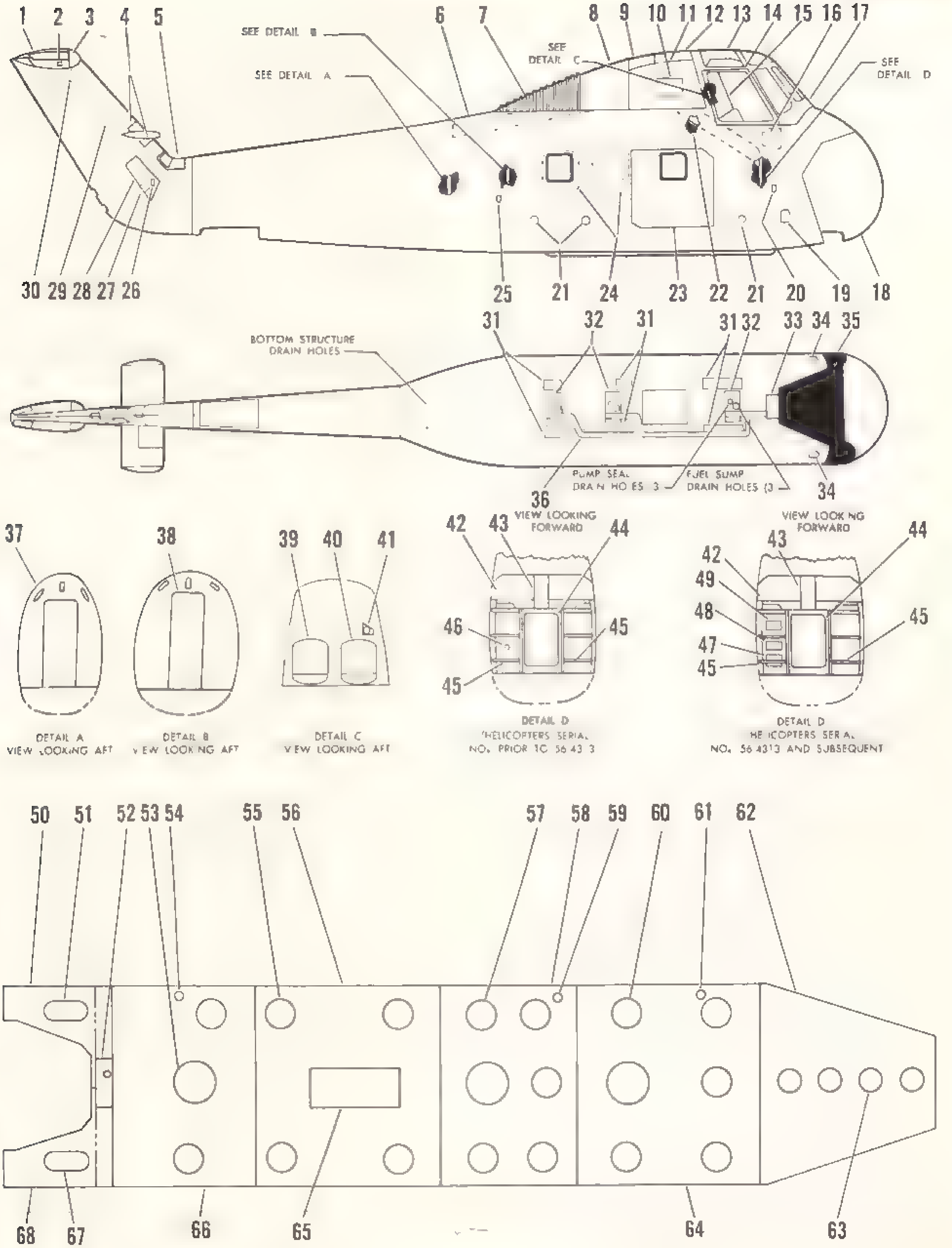


Figure 1–9. Access and inspection provisions (Sheet 2 of 2)

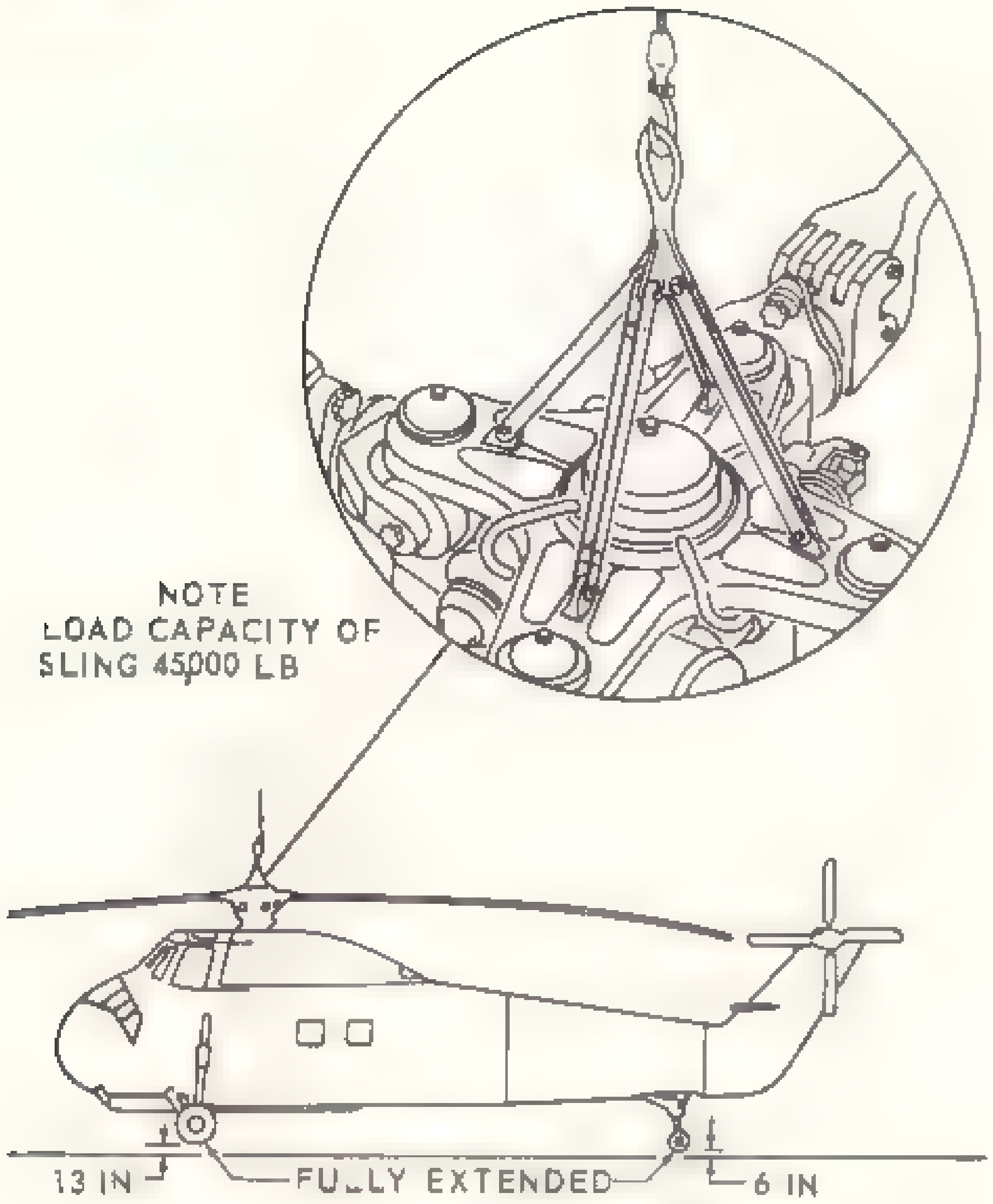


Figure 1–10. Hoisting helicopter

d. Before lowering helicopter, ensure that immediate area is clear of obstructions.

e. Properly stow removed loose equipment.

1–47. Hoisting Pylon- (See figure 1–11.) During removal or installation procedures, the tail rotor pylon is hoisted and supported by the pylon hoisting sling. To hoist the pylon, proceed as follows:

Caution

The two handles on the leading edge of the pylon must never be used to support or hoist the pylon.

a. Wrap straps around pylon with lower strap through hand hole below screen on trailing edge of pylon. Lock clips.

b. Attach hoist to ring.

c. Check to see that straps are positioned over red strips on either side of pylon.

d. Support weight of pylon with hoist while removing or installing attaching parts of pylon.

1–48. Jacking. a. To jack entire helicopter, use jack pads on two main landing gear fittings and jack pad on fitting on bottom of tail cone. (See figure 1–12.)

Caution

Do not jack helicopter with parking brakes on.

b. To remove main wheel, chock tail wheel and other main wheel and place jack under jack pad near tiedown ring on main landing gear leg.

Note

Ground clearance of jack pad near tiedown ring on main landing gear leg is 9.25 inches; jack lift required for 2-inch wheel clearance is 9.5 inches.

c. To remove main landing gear assembly, chock tail wheel and other main wheel and place a suitable jack under jack pad on main landing gear fitting on bottom structure.

Note

Ground clearance of jack pad on main landing gear fitting on bottom structure is 20.25 inches when tires are fully deflated; jack lift required for 2-inch wheel clearance is 19.5 inches.

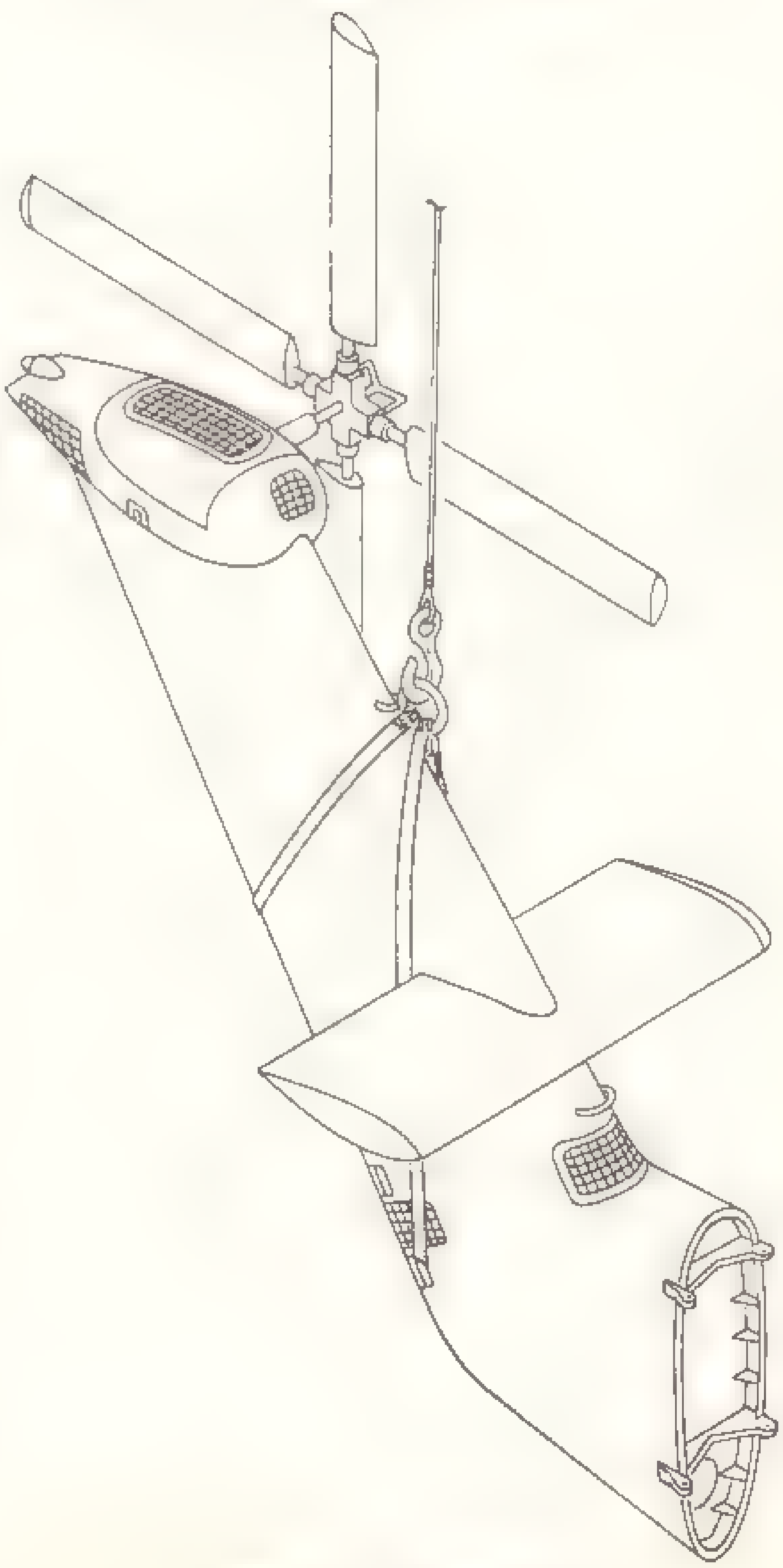


Figure 1–11. Hoisting pylon

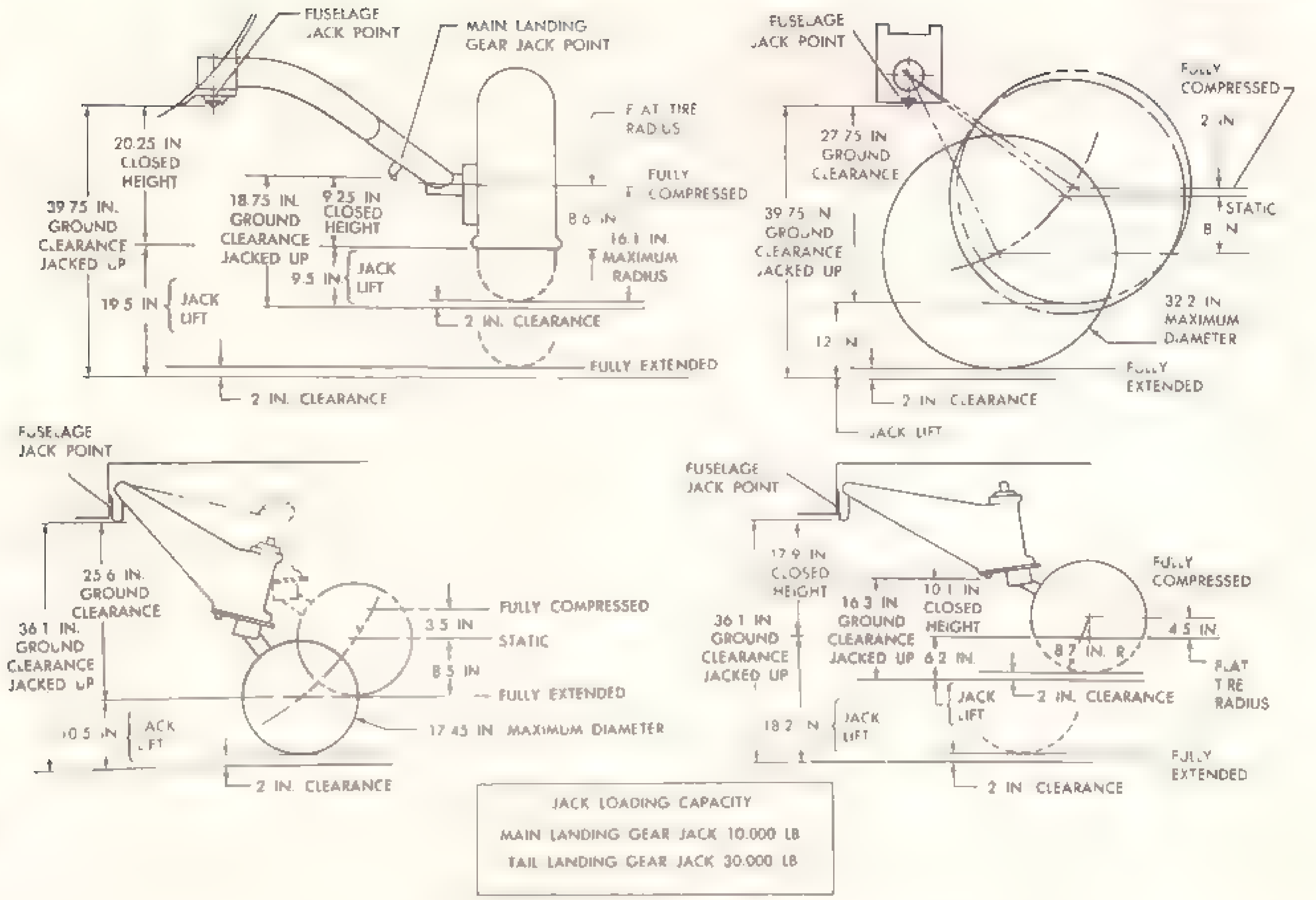


Figure 1–12. Jacking helicopter

d. To remove tail wheel, chock each main wheel and place a suitable jack under jack pad on tail landing gear yoke.

Note

Ground clearance of jack pad on tail landing gear yoke is 10.1 inches when the tire is fully deflated; jack lift required for 2-inch wheel clearance is 6.2 inches.

e. To remove tail landing gear assembly, chock each main wheel and place a suitable jack under jack pad on landing gear fitting under tail cone.

Note

Ground clearance of jack pad on landing gear fitting under tail cone is 17.9 inches when tire is fully deflated; jack lift required for a 2-inch wheel clearance is 18.2 inches.

1–49. Leveling. Two leveling procedures are used on the helicopter. One procedure is used when leveling the entire helicopter. The second procedure is used when leveling the main rotor head assembly. When the helicopter is level, the axis of the main rotor head assembly is three degrees forward of the perpendicular. The rotor head assembly must be level when rigging the main rotor flight controls. Removal and installation of the main rotor head assembly are facilitated if the axis of the hub is perpendicular.

a. Leveling helicopter. (1) To level helicopter, use jacks, on jack pads on two main landing gear fittings and at jack pad on fitting on bottom of tail cone. (See figure 1–12.)

(2) Hang plumb line from leveling slot provided on top frame of cargo door to leveling plate installed on bottom of door frame. (See figure 1–13.)

(3) Adjust height of jacks as required to precisely line up plumb bob at O point of scribed markings on leveling plate.

Note

If jacks are not available, level helicopter by increasing or decreasing air pressure in landing gear shock struts.

b. Leveling main rotor head assembly. (1) Jack helicopter at jack pads on two main landing gear fittings and at jack pad on fitting on tail cone with jacks. (See figure 1–12.)

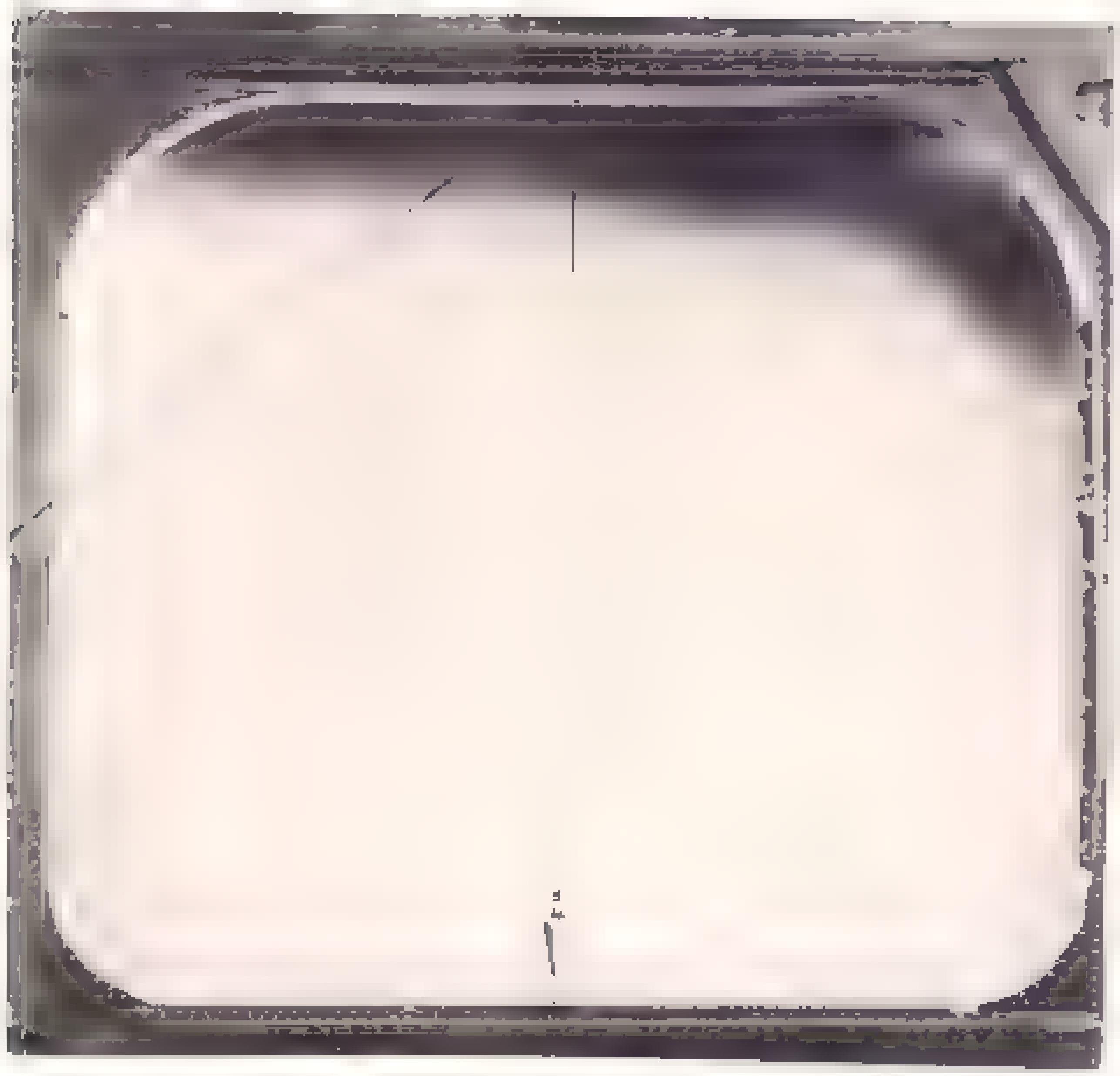


Figure 1–13. Leveling helicopter

(2) Align two opposite sleeve-spindle assemblies of main rotor head assembly with longitudinal axis of helicopter.

(3) Use level on upper plate of main rotor head assembly and adjust height of jacks as required to level main rotor head assembly transversely and longitudinally.

Note

If jacks are not available, level main rotor head assembly by increasing or decreasing air pressure in landing gear shock struts.

1–50. Mooring Instructions. The helicopter is moored to ensure its immovability, protection, and security under adverse weather conditions. The following information gives, in detail, the instructions for proper mooring of the helicopter:

a. Mooring (blades in flight position). (see figure 1–14.) The following mooring procedure is to be used only in high winds. Continued daily use will result in bending of blades trailing edge tabs.

(1) Install protective covers as required. (Refer to paragraph 1–58.)

(2) Place collective pitch control in low pitch position and cyclic control stick in neutral. Set parking brake.

(3) Turn main rotor to position blades at approximately 45 degrees with longitudinal axis of helicopter. Lock main rotor with rotor brake.

(4) Secure mooring lines from mooring rings on helicopter to fixed moorings on field. Place wheel chocks forward and aft of each main landing gear wheel.

(5) Install cover assembly, part No. S1670-10506-16, over tip of each blade by attaching assist pole fork, part No. S1570-21654, onto assist pole, part No. S1670-10506-4, and insert assist pole fork into both pockets of cover. Pull cover over tip of blade.

(6) Secure free ends of each rope to nearest landing gear strut with suitable knot and no slack in rope. Maximum allowable deflection of blades from static position is 6 inches.

Caution

Excessive tightening of ropes will bend blades.

(7) To remove cover assembly, release ropes and remove covers with aid of ropes.

b. Mooring (blades folded). (See figure 1–15.) (1) Head helicopter into wind.

(2) Fold pylon. (Refer to paragraph 1–54.) Fold main rotor blades. (Refer to paragraph 1–56.)

(3) Secure mooring lines to tiedown rings on helicopter. Chock all wheels.

Note

Protective covers provided are to be installed as required. (Refer to paragraph 1–58.)

1–51. Parking. Parking is defined as a condition under which the helicopter will be secured on the ground. When parking the helicopter, the direction of heading is normally determined by ease of maintenance and servicing and not by prevailing wind direction. Maximum velocity of surface winds which can be withstood while parked in this manner depends upon the gross weight of the helicopter. (See figure 1–16.)

a. Normal parking procedure. When parking the helicopter under normal conditions, use the following procedures:

Note

Park helicopter in level ground position, when possible, so that load on each main landing gear leg will be balanced.

(1) Set main wheel parking brakes by depressing both toe brake pedals and pulling out handle marked PARKING BRAKE, located to left of pilot's tail rotor pedal adjustment knob.

Note

Do not set wheel brakes when brakes are hot.

(2) With tail wheel in trailing position, pull out TAIL WHEEL LOCK handle, located below instrument panel.

(3) Position main rotor blades at approximately 45 degrees with longitudinal axis of helicopter. Lock blades in this position with rotor brake.

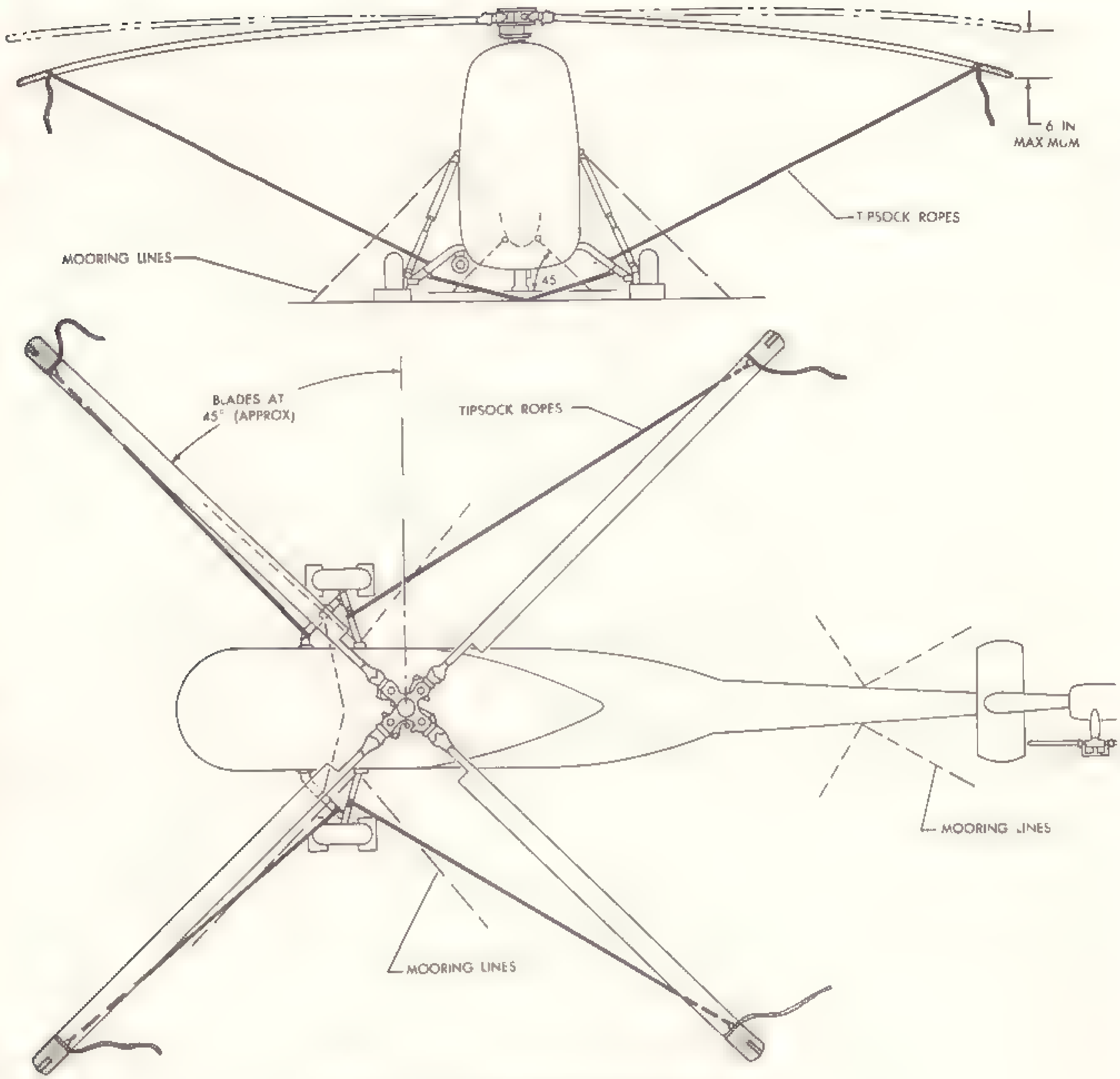


Figure 1—14. Mooring helicopter (blades in flight position)

(4) Place collective pitch control in low position and cyclic control stick in neutral.

(5) Main landing gear wheels will be chocked by placing chocks fore and aft of each wheel, with each pair of chocks tied together with rope, wood cleats, or any other method to prevent chocks slipping away from tire. Sandbags may be used in lieu of chocks when helicopter is parked on steel mats.

(6) For rotor blade tiedown, refer to paragraph 1—50.

Note

When parking the helicopter, moor the rotor blades only when there is a possibility of high winds or a turbulence set up from prop or rotor blasts of other aircraft.

(7) Close all doors and windows. Turn all switches off. Install protective covers as climatic conditions dictate. (Refer to paragraph 1—58.)

b. High wind parking procedures (mooring). (1) When mooring helicopter, use wheel chocks. Secure installation of proper size wheel chocks is of great importance

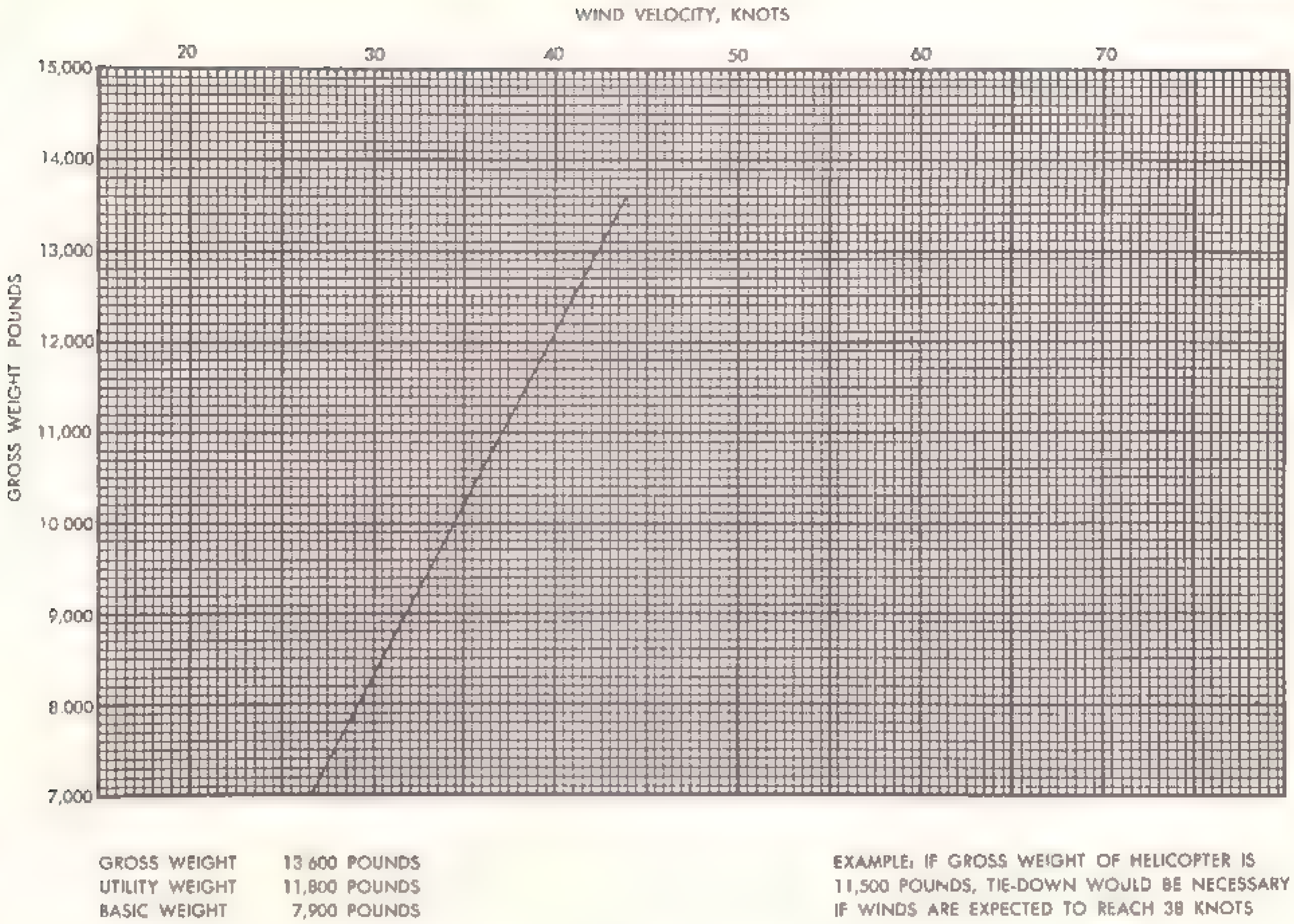


Figure 1—16. Mooring conditions chart

in mooring helicopter for high velocity winds. For ice or snow, use metal collapsible ice-grip chocks. These chocks vary with tire size. Another important factor is weight of helicopter. Figure 1—16 gives weight and relative wind velocities that make tiedowns necessary. To make use of these figures, it is advisable to know approximate weight of helicopter in its various configurations. During emergencies, knowledge of this information is especially useful for selecting helicopters that need to be tied down first. Helicopters tied down in this manner can withstand winds up to 60 knots. Above 60 knots, helicopters may sustain minor damage.

Warning

Sturctural damage can occur from high velocity surface winds. If at all possible, helicopter should be evacuated to a safe weather area if a tornado, hurricane, or winds above 75 knots are expected.

(2) Helicopters parked on hard-surfaced areas utilizing ground mooring points will be positioned as shown in figure 1—17. In event tiedown rings are not available, helicopters will be moved to an area where anchor kits can be applied.

(3) When high winds are expected to reach or exceed velocities as shown in figure 1—16, moor helicopter as outlined in steps (4) through (12) below.

(4) Head helicopter in direction from which highest forecast wind or gusts will come.

(5) Locate helicopter slightly more than rotor span distance from other helicopters.

(6) Deflate shock struts and fill all fuel tanks if time permits.

(7) Place wheel chocks fore and aft of main landing gear wheels and secure by nailing wood cleats from chock to chock on each side of each wheel. Use rope to secure chocks when wood cleats are not available or when using ice-grip chocks.

(8) Utilizing tie-down kit, part No. AN8015-2, FSN 1730-491-0330, fasten to upper main landing gear attachment points, one on either side, and extend outward to ground mooring points. Use chain, 3000 pound pull test, or 1/2 inch manila rope if cable is not available. (See figure 1—17.)

(9) Fasten two 1/4-inch aircraft cables, chains, or ropes to auxiliary securing point at tail wheel and moor as shown in detail A of figure 1—17.

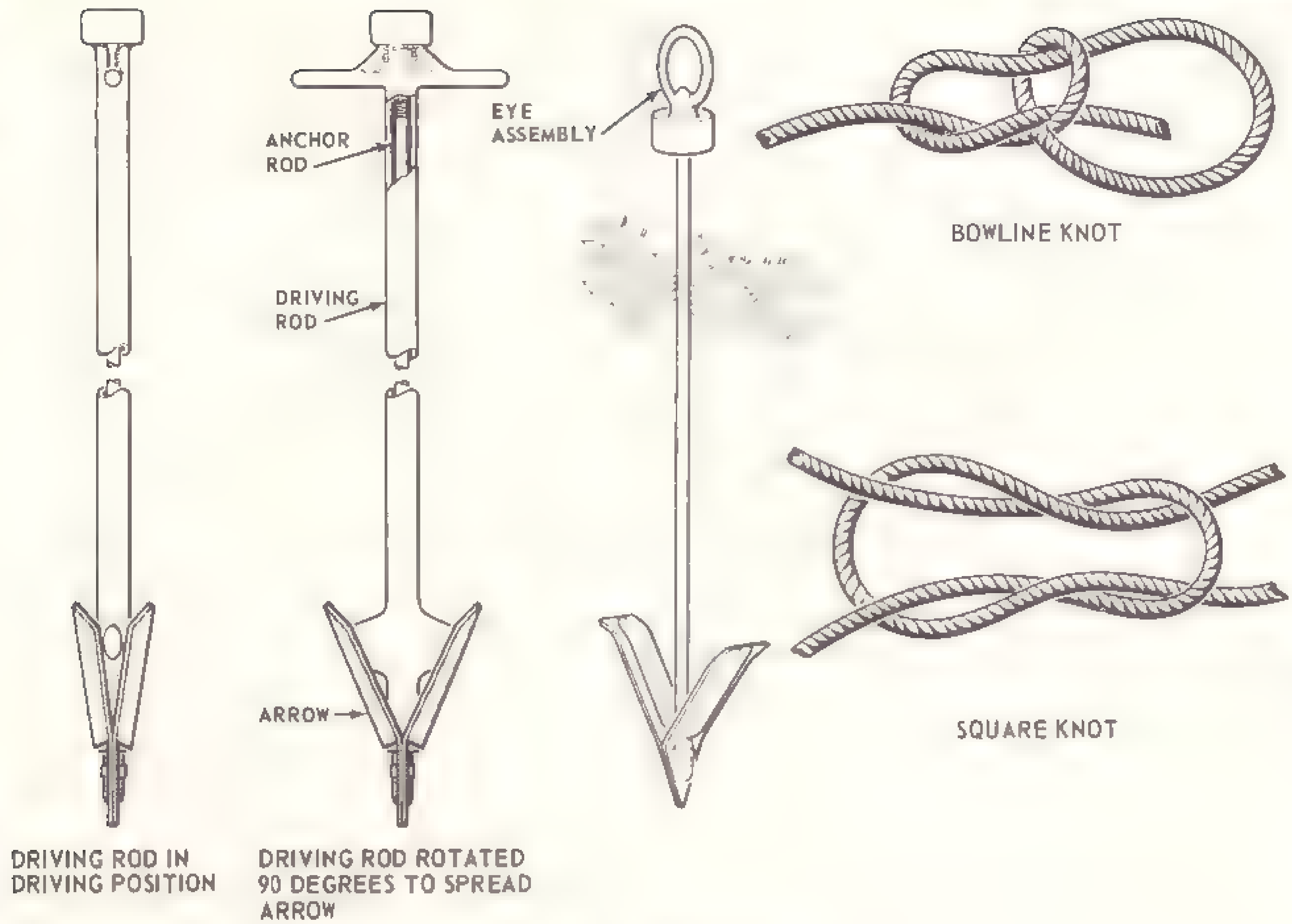


Figure 1–18. Mooring equipment

Note

After high winds, check helicopter for damage from flying objects and buffeting. Connect battery and inflate struts prior to flight.

c. Use of mooring kits. When parking area mooring anchors are not available or accessible, use dead-man type anchors that will sustain a 3000 pound pull test without failure of mooring kit. Position helicopter and anchors as shown in figure 1–19 and install anchors as follows:

(1) Screw anchor rod into arrow.

(2) Slip driving rod over anchor rod and into socket of arrow.

(3) Turn cam of driving rod so prongs of arrow are not spread by driving.

(4) If ground is hard, break surface with ground breaking pin.

(5) Align rod with helicopter mooring fittings (figure 1–19), and drive arrow in ground until driving rod handle is approximately 3 inches from ground.

(6) Rotate driving rod handle 90 degrees and give it a sharp blow to spread arrow prongs.

(7) Return driving rod to driving position and withdraw.

(8) Align squared eye of socket assembly with squared end of anchor rod, fit it in place, and screw knurled nut down tight.

(9) Set arrow prongs by pulling up on eye assembly.

Note

Withdraw anchor rods by turning eye assembly counterclockwise. Leave arrows in ground.

1–52. Towing. (See figure 1–20.) Tow helicopter forward by attaching standard tow tug and tow bar to tie-down ring on each main landing gear leg. The helicopter can be towed backward or pushed forward by inserting pin of tow bar through hole in tail landing gear axle. Observe following precautions when towing helicopter:

Caution

Do not push helicopter backward when tow bar is attached to main landing gear.

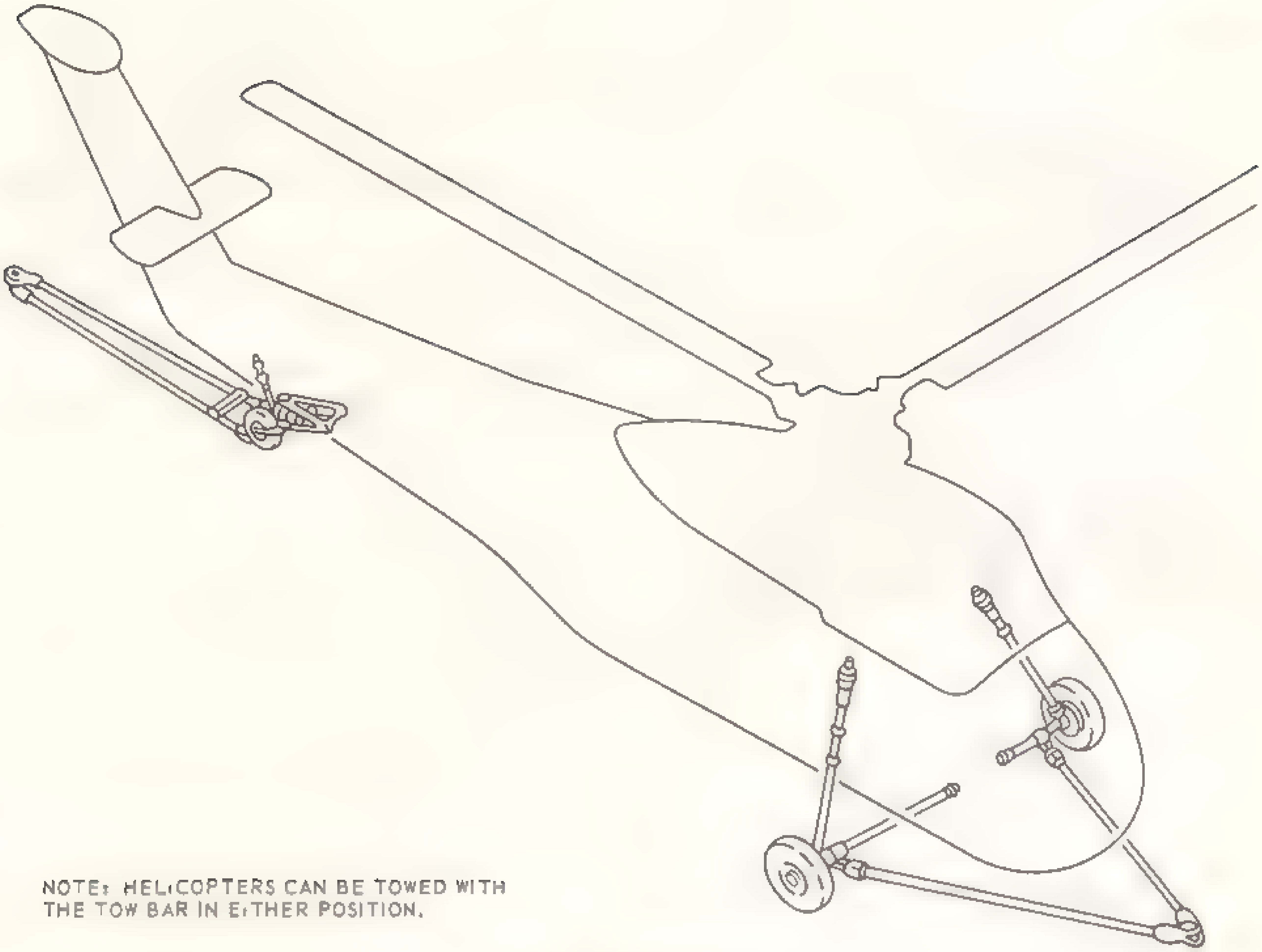


Figure 1—20. Towing helicopter

c. Move small ratchet pin to down position.

d. Retract pylon lockpins by moving wrench assembly slowly and smoothly from aft to forward. Red warning flag will pivot into sight automatically.

Caution

Do not allow pylon to swing out of control during folding operation.

Caution

Do not apply force to wrench assembly once lockpins have retracted and bottomed.

e. Turn ratchet pin to up position. Secure handle of wrench assembly in spring-loaded latch.

f. Swing pylon to left side of tail cone. Secure pylon in folded position by pressing rod on tail cone into fitting on pylon.

Note

Folding pylon releases spring-loaded coupling in tail rotor drive shaft. On helicopters serial No. prior to 55-4497, coupling automatically engages brake plate and prevents tail rotor blades from windmilling. Move brake plate lock to LOCKED position to engage coupling and prevent tail rotor blades from windmilling on helicopters serial No. 55-4497 and subsequent. Decal placed adjacent to tail rotor drive shaft disconnect coupling on inside of pylon shows locked and unlocked positions.

Caution

Visually inspect pylon hinge locks after pylon is folded to be sure lower lockpin is fully engaged.

Caution

Make certain that rotor brake is released before turning main rotor blades.

Caution

Do not handle blades with rope. Do not deflect blades more than 5 feet from their droop position.

e. Lock main rotor with rotor brake. Support aft right blade. Cut lock wire and unscrew knob of lock assembly on horn to permit sleeve and blade to turn.

f. Remove upper taper pin to permit blade to hinge downward. Position rack, part No. S1670-10013, approximately 48 inches from outboard end of rotor blade and lower blade carefully.

Caution

Extra care should be taken when handling wet main rotor blades as they become slippery, thus increasing the possibility of dropping them.

g. Fold blade to side of tail cone and secure blade, with leading edge down, in upper pocket of storage assembly.

Caution

Carefully lower blade into pocket of stowage assembly so that blade cannot be scratched by hinge pin or any other metal parts of stowage assembly.

Caution

Do not attempt to fold main rotor blades with horn lockpin engaged.

h. Fold forward right blade as in steps *e* through *g* and secure blade in lower pocket of stowage assembly.

i. Support aft left blade. Cut lockwire and unscrew knob of lock assembly on horn to permit sleeve and blade to turn. Disconnect bonding jumper.

j. Install blade rotator, part No. S1670-10051-1, FSN 5120-546-8557, on inboard end of blade and secure it with wing nuts. Rotate blade 180 degrees and remove rotator.

Caution

Do not attempt to rotate blade with horn lockpin engaged.

k. Remove taper pin, which is now at top, to permit blade to hinge downward. Fold blade to side of tail cone and secure blade, with leading edge down, in upper pocket of stowage assembly.

Caution

Carefully lower blade into pocket of stowage assembly so that blade cannot be scratched by hinge pin or any other metal parts of stowage assembly.

l. Fold forward left blade as in steps *i* through *k* and secure blade in lower pocket of stowage assembly.

Caution

Blade stowage assembly pockets for blade support only.

Note

When using blade stowage assembly, part No. S1670-10481-25, install blade stowage assembly on tail cone at locating bracket. Line up yellow triangle on hinge of stowage assembly with red triangle on locating bracket. Proceed with steps *b* through *l*. Install blade stowage pocket, part No. S1670-10523, on aft left blade. Secure straps on pylon below stabilizer.

1–57. Unfolding Main Rotor Blades. Unfold main rotor blades as follows:

Caution

Do not handle blades with rope. Do not deflect blades more than 5 feet from their droop position.

a. Release forward left blade from lower pocket, hinge blade forward to installed position, and install top taper pin.

Caution

Carefully remove blade from stowage assembly so that blade will not be scratched by hinge pin or any other metal parts of stowage assembly.

b. Install blade rotator, part No. S1670-10051-1, FSN 5120-546-8557 on inboard end of blade and secure with wing nut. Rotate blade 180 degrees until sleeve is in normal position and remove rotator.

Caution

Do not attempt to rotate blade with horn lockpin engaged.

c. Lock sleeve in position by turning knob of lock assembly located on horn. Secure knob with lockwire. Connect bonding jumper.

Caution

Do not overtorque the knob when securing the sleeve in flight position. Overtorquing the knob will preload the bracket and could cause failure of the bracket. Apply only enough torque to the knob to assure that the plunger is firmly seated in the bracket and then safety wire the knob.

d. Remove blade stowage pocket from aft left blade and release blade from upper pocket of stowage assembly. Unfold blade as in steps *a* through *c*.

Note

When using blade stowage assembly, part No. S1670-10481-25, remove blade stowage pocket from aft left blade. Unfold the blade as in steps *a* through *d*.

Table 1—4. Installation of protective covers (Sheet 2 of 2)

DESCRIPTION	FIG. 1—23 INDEX NO.	METHOD OF INSTALLATION
Tail Rotor Assembly Cover	5	Fit cover on tail rotor hub. Tie binding inboard of hub. Secure slide fasteners on joining seams of horizontal openings.
Tail Rotor Blade Cover	4	Position tail rotor blades at an angle of 45 degrees to center line of helicopter. Slide cover on each blade and secure each cover at inboard end of each blade with attached tape. To prevent tail rotor blades from flapping when covered in flight position, wrap outboard tape on each cover around pylon and tie tapes with suitable knot. ***Caution*** Do not tighten tapes enough to bend blades.
Windshield Cover	1	Position cover over cockpit canopy with pitot tube through opening in right-hand side of cover and loop antenna in boot on top of cover. Secure tapes at following locations: Each landing gear strut, each landing gear leg, nose door handles, main gear box drive shaft, and latch on each service platform.
Pitot Tube Cover	2	Slip cover over end of pitot tube and secure it in position with drawstrings.
Main Gear Box Oil Cooler Air Exit Cover	10	Snap-fasten each edge of cover to canopy and fuselage skins that surround louvered fairing.
Main Transmission Screen Cover	11	Snap-fasten each edge of cover to service platform doors, cockpit canopy, and canopy fairing. Snap-fasten cover around main gear box drive shaft and control arms and servo unit assemblies.
Tail Rotor Gear Box Cover	6	Fit cover over tail rotor gear box fairing and gear box shaft and tie binding at base of fairing. Secure slide fasteners on joining seams beneath tail rotor gear box shaft.
Lower Pylon Cover	8	Fit cover over pylon screen fairing aft of hinge bulkhead and pylon grill aft of intermediate gear box. Assure that tapes are extending downward. Wrap belt around bottom of pylon and fasten with buckle. Secure cover at ends with attached tapes.
Exhaust Port Cover	2	Slip cover over exhaust port and tie with suitable knot.
Engine Air Exit Cover	3	Position cover over engine air exit with sleeve on cover over tail pipe. Snap-fasten cover to lower edge of nose doors and to fuselage bottom skin. Secure tie around tail pipe. When engine preheat duct is not installed, close opening in cover by securing tie on sleeve.
Nose Door Air Outlet Cover	4	Snap-fasten cover over openings in nose doors below latch handles.
Blade Stowage Pocket Cover	7	Position cover over tip of main rotor blade to prevent chafing when pylon is folded. Secure cover at ends with attached tapes.

Caution

Make certain that all warning streamers are visible when installing each protective cover.

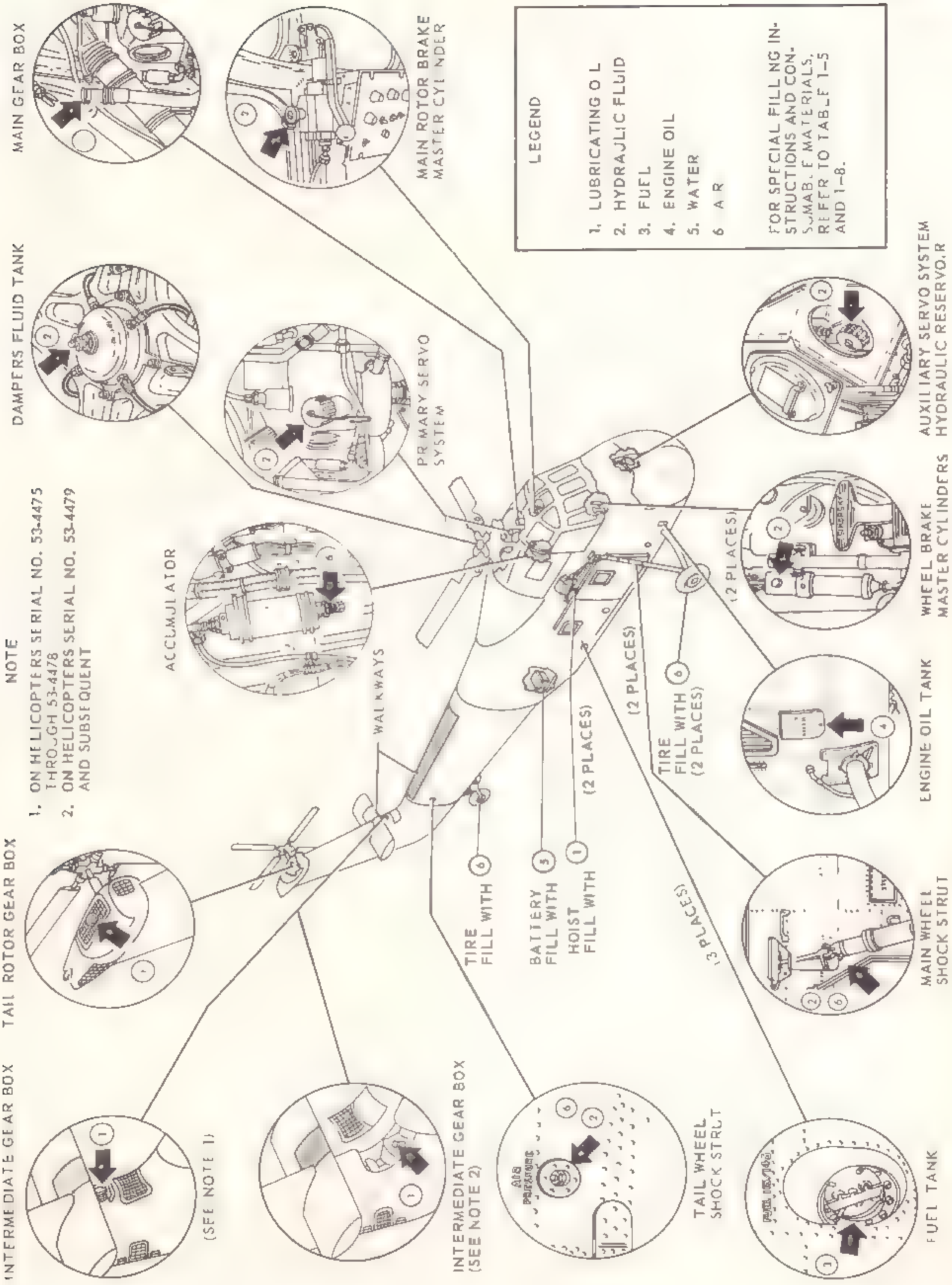


Figure 1-24. Servicing diagram (helicopters serial No. prior to 56-4313)

Table 1–5. Servicing capacities (Sheet 1 of 4)

REPLENISH WITH		US. MEASURE	CAPACITY BRITISH MEASURE	METRIC MEASURE	SPECIAL INSTRUCTIONS
FUEL SYSTEM					
Aviation Gasoline (item 1, table 1–8) Grade 115/145 (Alternate Grade 100/130) **Note** Fuel quantities are actual values for a 3-degree nosedown attitude. **Caution** Do not add alcohol to aviation fuels for use in the helicopter, regardless of type fuel cells or tanks installed.	Total Capacity Forward Tank Center Tank Aft Tank Usable Fuel Forward Tank Center Tank Aft Tank Unusable Fuel (Forward Tank) Sump Capacity (Each Tank)	 101.0 gal 70.0 gal 92.0 gal 100.0 gal 70.0 gal 92.0 gal 1.0 gal 0.3 gal	 84.10 Imp. gal 58.29 Imp. gal 76.61 Imp. gal 83.27 Imp. gal 58.29 Imp. gal 76.61 Imp. gal 0.83 Imp. gal 0.25 Imp. gal	 382.3 liters 264.9 liters 348.2 liters 378.5 liters 264.9 liters 348.2 liters 3.8 liters 1.1 liters	During all refueling and tank purging Operations, attach two ground wires from different points on helicopter. Before dispensing any fuel to helicopter, ground helicopter to truck or fuel servicing unit. **Note** Refueling and other operating vehicles must be parked at least 20 feet from the helicopter during refueling operations. Plug hose nozzle ground line into grounding jack above fuel filler. Do not conduct fuel servicing, or other operations involving transferring of fuels, within 50 feet of any aircraft undergoing radar ground check operations.
ENGINE OIL SYSTEM					
Lubricating Oil (item 2, table 1–8) Grade 1100 **Caution** Do not overfill. Overfilling reduces necessary foaming space.	Oil Capacity Expansion Allowance Volume Equivalent	10.5 gal 5.0 gal	8.74 Imp. gal 4.16 Imp. gal	39.7 liters 18.9 liters	A stick-type level gage is located under oil tank filler cap. Fill to marks on gage. Allow time for oil to find its level in both tanks. Recheck oil level and refill as necessary.
MAIN GEAR BOX (MAIN TRANSMISSION)					
Lubricating Oil (item 8, table 1–8) Grade 2	Total Volume With Oil Cooler Without Oil Cooler	 5.0 gal 3.0 gal	 4.16 Imp. gal 2.49 Imp. gal	 18.9 liters 11.4 liters	Hinge down left service platform. Fill to full mark on sight level gage on lower left side of gear box. **Note** Before servicing gear box, allow a minimum of 1/2 hour after gear box operation.

Table 1–5. Servicing capacities (Sheet 3 of 4)

REPLENISH WITH		CAPACITY US. MEASURE	BRITISH MEASURE	METRIC MEASURE	SPECIAL INSTRUCTIONS
AUXILIARY HYDRAULIC SYSTEM RESERVOIR					
Hydraulic Fluid (item 3, table 1–8)	Reservoir	0.45 gal	0.37 Imp. gal	1.70 liters	On helicopters serial No. prior to 56-4313, with reservoir in clutch compartment, remove clutch access door and oil reservoir cover. On helicopters serial No. 56-4313 and subsequent, with reservoir in transmission compartment, hinge down right service platform. With helicopter in a three-point attitude, hydraulic system uncharged, collective control stick in low pitch, and cyclic control stick in neutral, fill reservoir to full mark on sight level gage.
	Refill	0.40 gal	0.37 Imp. gal	1.51 liters	
	Note On helicopters serial No. Prior to 56-4313, auxiliary servo system hydraulic reservoir is located in clutch compartment. On helicopters serial No. 56-4313 and subsequent, oil reservoir is located on right side of transmission compartment.				
WHEEL BRAKE SYSTEM MASTER CYLINDERS					
Hydraulic Fluid (item 3, table 1–8)	Total (Approx)	8.0 oz	6.7 Imp. oz	236.6 CC	Fill master cylinders at filler plug on each cylinder. Bleed system in accordance with instructions in paragraph 6–40.
MAIN LANDING GEAR SHOCK STRUTS					
Hydraulic Fluid (item 3, table 1–8)					For servicing instructions, see nameplate on strut and refer to paragraph 4–74a.
Air					For servicing instructions, see nameplate on strut and refer to paragraph 4–74a.
TAIL LANDING GEAR SHOCK STRUT					
Hydraulic Fluid (item 3, table 1–8)					For servicing instructions, see nameplate on strut and refer to paragraph 4–74a.
Air					For servicing instructions, see nameplate on strut and refer to paragraph 4–74a.

Table 1–6. Draining locations (Sheet 1 of 2)

DRAIN	LOCATION	SPECIAL INSTRUCTIONS
Oil Cells (Left and Right)	Engine Compartment Forward of Oil Cooler	Attach a hose to Y-drain valve, open valve, and drain oil into receptacle.
Oil Cell Sumps	Bottom of Right and Left Oil Cells	Drain water by loosening each drain valve, and draining water into receptacle.
Oil Cooler	Forward, Right Corner of Oil Cooler.	Remove large hex-head plug and drain oil into receptacle.
Engine Oil Sumps	Front Oil Sump and Rocker Box Sump	Open nose doors, remove magnetic plug from front oil sump, and drain oil into receptacle. Remove sump strainer plug from rocker box sump and drain oil into receptacle.
Engine Oil Strainer	Lower Section of Accessory Drive	Open nose doors, remove magnetic plug, and drain oil into receptacle. **Note** Inspect magnetic plug for particles.
Manifold Pressure Line	Below Manifold Pressure Gage on Pilot's Side	Operate engine with manifold pressure reading below atmospheric pressure. Press purge valve button to allow atmospheric pressure to enter valve and force air through manifold, indicating tubing carrying any moisture within tubes into engine intake manifold. Close valve.
Pitot-Static System	Right Side Electronics Compartment Bulkhead, Left and Right Sides of Forward Cabin Bulkhead.	Unscrew caps from tees and drain water.
Clutch Drive Housing	Aft of Engine and Fan Assembly	Remove clutch access door at cabin forward bulkhead, rotate clutch to facilitate emptying, unscrew plug from drive housing cap, and drain lubricant into receptacle.
Reservoir-Primary Servo Hydraulic System	Hydraulic Panel on Left Side of Main Transmission	Hinge down left service platform, remove plug and gasket at base of reservoir, and drain hydraulic fluid into receptacle.
Reservoir-Auxiliary Hydraulic System (Serial No. Prior to 56-4313)	Hydraulic Panel in Clutch Compartment	Remove clutch access door at cabin forward bulkhead, remove plug and gasket at base of reservoir, and drain hydraulic fluid into receptacle.
Reservoir-Auxiliary Hydraulic System (Serial No. 56-4313 and Subsequent)	Hydraulic Panel on Right Side of Main Transmission	Hinge down right service platform, remove plug and gasket at base of reservoir, and drain hydraulic fluid into receptacle.
Main Transmission (Main Gear Box)	Tedeco Drain Unit at Bottom of Main Transmission Oil Pump	Unsnap soundproofing panel at cabin ceiling under oil pump access panel and remove access panel. Remove magnetic plug from Tedeco drain unit and screw Tedeco drain tube attachment, part No. 0 D-730, or equivalent, into drain attachment unit, and drain lubricant into receptacle. Drain while hot if possible. **Note** Inspect magnetic plug for particles.

Caution

Do not use water excessively. Great care should be taken to prevent water from seeping through the cabin floor.

Caution

Do not use solvents on leatherette upholstery.

c. Remove stubborn grease and oil spots with a cloth moistened with solvent (item 4, table 1—8). Use a dry cloth to remove solvent.

1—64. Cleaning Plastic Surfaces. The aircraft windshield and windows are of transparent acrylic plastic construction and are highly susceptible to crazing, optical distortion, and scratches. Cloths used to apply cleaning agents must be clean, soft, and lint-free. Cloths used for cleaning plastic surfaces are to be stored in closed containers or protected rolls to keep them clean and grit-free. Clean plastic surfaces as follows:

a. Flush plastic surface with water to remove dust or other residues. Use fingers gently to feel and dislodge dirt, salt, etc. Remove rings from fingers to avoid scratching plastic surface.

Note

Clean plastic surfaces in a shaded area. The use of water in bright sunlight can cause water spotting which will decrease vision.

b. Wash plastic surface with detergents (item 13 or 15, table 1—8) in concentrate of 1 to 2 ounces per gallon of water, using a suitable cloth, chamois leather, or sponge. Use fingers as described in step *a* above.

c. Rinse plastic surface with water and dry with a chamois leather or sponge.

d. Dissolve grease and oil deposits with a clean, soft, cloth dampened with naphtha (item 16, table 1—8).

e. After cleaning, apply cleaning and polishing compound (item 17, table 1—8) to plastic surfaces.

Caution

Do not rub plastic surface after it is dry.

1—65. Cleaning Engine. a. Spray engine with a mixture of one part cleaning compound (item 60, table 1—8) and nine parts of solvent (item 4, table 1—8) or kerosene (item 56, table 1—8). Allow mixture to remain on engine for 10 to 15 minutes.

Warning

Before attempting to clean engine, park helicopter in an authorized cleaning area away from buildings, other aircraft and vehicles. Ground helicopter. Avoid breathing fumes by working from windward side.

b. Wash engine with water.

c. Dry engine with clean cloths or with compressed air.

1—66. Cleaning Exhaust Deposits. Apply cleaning compound (item 12, table 1—8) with a damp cloth or sponge to affected surface. Allow cleaning compound to act on affected surface for approximately 5 minutes and rinse with water.

1—67. Cleaning Battery Acid Deposits. Neutralize spilled battery acid by applying solution of sodium bicarbonate (item 18, table 1—8) and water on affected surface. Allow solution to remain for approximately 5 minutes, rinse, and dry thoroughly. Prime affected areas of battery compartment with primer coating (item 19, table 1—8). Paint all exposed surfaces within 12 inches of battery with two coats of lacquer (item 20, table 1—8).

Caution

Battery terminals must be kept coated with grease (item 21, table 1—8).

1—68. Cleaning Relief Tube. To clean and deodorize relief tube system, mix a solution of 1-1/2 ounces of deodorant (item 22, table 1—8) to 1 quart of water. Clean relief tube system as follows:

a. Using a soft bristled brush and deodorant solution, wash area around relief tube horn and exit.

b. Pour remainder of deodorant solution through relief tube. When offensive odor remains, use a stronger deodorant solution and reclean.

1—69. Lubrication After Cleaning. Lubricate area of aircraft exposed during cleaning in accordance with lubrication instructions outlined in Chapter 2.

1—70. List of Consumable Materials. All consumable materials, such as anti-icing and deicing fluids, cements, cleaning compounds, greases, hydraulic fluid, oils, sealants, solvents, etc, authorized for use at organizational level, are listed in table 1—8.

1—71. Special Tools and Equipment. The special tools and equipment used in organizational maintenance are illustrated and listed in TM 55-1520-202-20P, Organizational Maintenance Repair Parts and Special Tool Lists. Special tools and equipment illustrations will appear in this manual when the text is not sufficient to fully describe such operation.

Table 1–8. List of consumable materials (Sheet 2 of 2)

ITEM NO.	NOMENCLATURE	SPECIFICATION
40	Buffing and Polishing Compounds	MIL-B-16909
41	Adhesive, Rubber Base, General Purpose	MIL-A-5092
42	Insulation Tape, Electrical, Friction	HH-I-510
43	Shellac, Dry, Orange	TT-S-271
44	Solder, Tin Alloy, Lead-Tin Alloy and Lead Alloy	QQ-S-571
45	Sealing Compound, Thread and Gasket, Fuel, Oil, and Water Resistant	MIL-S-7916
46	Nitric Acid, Technical	O-N-350
47	Hydrochloric Acid, Muriatic, Technical	O-H-765
48	Sealing-Compound, Pressure-Cabin	MIL-S-7124
49	Cloth, Cotton, Birdseye and Gauze	CCC-C-8660
50	Silicone Compound	MIL-S-8660
51	Adhesive, Cellulose Nitrate	MIL-A-11238
52	Grease, Graphite, Aircraft Lubricating	MIL-G-7187
53	Grease, Aircraft, Helicopter Oscillating Bearing	MIL-B-25537
54	Antiseize Compound, White Lead Base, General Purpose	TT-A-580
55	Tape, Glass Fiber, Asphalt and Oil Impregnated	MIL-T-19292
56	Kerosene	VV-K-211
57	Thinner, Cellulose-Nitrate-Dope, Blush-Retarding	MIL-T-6095
58	Metal Conditioner and Rust Remover	MIL-C-10578
59	Grease, Molybdenum Disulfide	MIL-G-21164
60	Compound, Engine Cleaning	MIL-C-5546
61	Lubricating Oil, Internal-Combustion Engine, Heavy Duty	MIL-L-2104
62	Grease, Aircraft, General Purpose	MIL-G-7711
63	Grease, Plug Valve, Gasoline and Oil Resistant	MIL-G-6032
64	Gasoline, Unleaded	VV-G-109
65	Solvent (Turco Solvent, Transpo, ASO Stock No. R51-C-15-63, Turco Products, Inc, Willmington, Calif.)	
66	Trichloroethylene, Technical	O-T-634
67	Solvent (Turco Solvent, Stock No. 3823, Turco Products, Inc, Willmington, Calif.)	
68	Cleaner (Ardrox 640, Brent Chemical Products Limited, Commerce Road, Middlesex, England)	
69	Preservative Solution (Ardrox 39/1, Brent Chemical Products Limited, Commerce Road, Middlesex, England)	
70	Ether, Petroleum, Technical-Grade	O-E-751
71	Penetrating Oil	VV-P-216
72	Thread Compound, Antiseize, Graphite-Petrolatum	MIL-T-5544
73	Graphite, Lubricating	MIL-G-6711
74	Lubricating Oil, Instrument, Aircraft, Low Volatility	MIL-L-6085
75	Lacquer, camouflage	TT-L-20
76	Aluminum Alloy Plate and Sheet	QQ-A-250/11
77	Compound, Lubricating, Inner Tube	MIL-C-5024
78	Tape, Vinyl Plastic Pressure Sensitive	1560-724-3306

CHAPTER 2

LUBRICATION INSTRUCTIONS

Section I General Lubrication Requirements

2–1. Helicopter Lubrication. The periodic application of recommended lubricants to their relevant bearing surfaces, as detailed in the following paragraphs, together with the observance of absolute cleanliness, will ensure the maximum efficiency and utmost service of all moving parts.

2–2. Lubrication Frequencies. Lubrication frequencies may be increased to meet local and climatic conditions. This will ensure longer life to moving parts by keeping accumulations such as dust, dirt, or sand from entering crevices, grooves, etc.

2–3. Lubrication Precautions and Procedures. The following paragraphs give precautions and procedures that should be followed to provide maximum durability. Supplementary data on lubrication of oil-lubricated and grease-lubricated bearings, including cleaning precautions and lubricating procedures, are given in paragraphs 1–33 through 1–40.

2–4. Grease Gun Application. Care must be taken when lubricating bearing and bearing surfaces with a grease gun, to ensure that gun is filled with new, clean grease of the grade specified for the particular application before applying lubricant to the grease fittings.

2–5. Oil Can Application. A controllable-type squirt can is recommended for this type of application. After oil is applied, wipe oil spillage from the area surrounding the bearing surfaces.

2–6. Dust, Dirt, or Sand Accumulation. Dust, dirt, or sand combined with grease, oil, or graphite form an abrasive compound; therefore, it is important to remove excess lubricant from all moving parts subject to extremely dusty conditions. In prolonged dusty operating conditions, dust or dirt accumulations in grease fittings and bearing surfaces can be minimized by reducing the lubrication period to meet the local operating conditions.

2–7. Corrosion. To reduce the possibility of corrosion in the helicopter structure, keep drainage holes clear. Moving parts that are normally exposed to condensation and water should always be well protected by lubricant.

2–8. Grease Fittings. Grease fittings throughout the helicopter are of the Alemite type, suitable for use with a hand or air-operated grease gun. When applying lubricant to grease fittings the grease should be forced through until new grease appears at part(s) being lubricated.

Note

Grease fittings should always be cleaned before applying fresh grease.

Section II Lubrication Charts

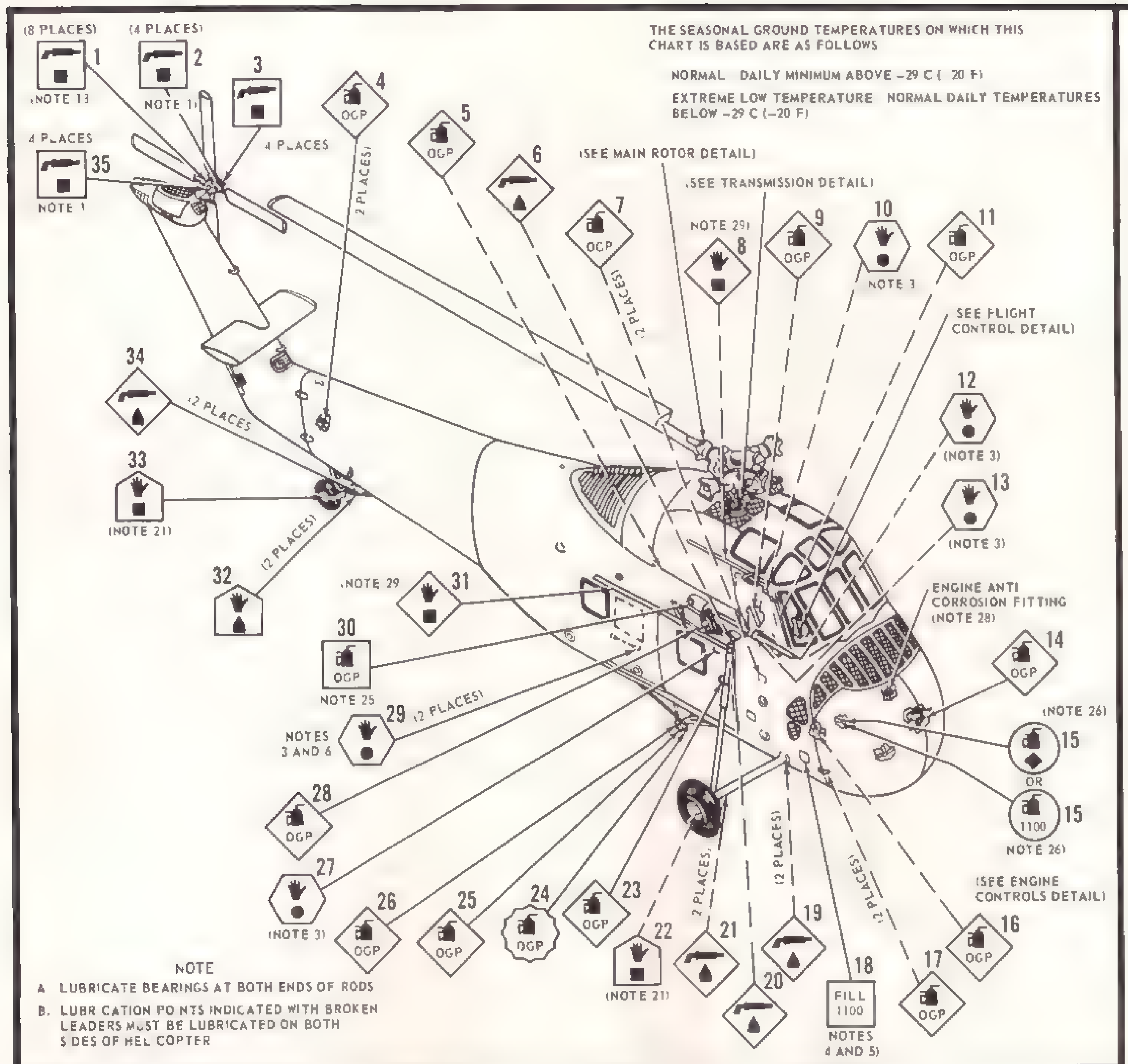
2–9. General. The lubrication chart (figure 2–1) covers all lubrication points on the helicopter. Sheet 1 is the basic lubrication chart for the helicopter. Sheet 2 through 4 cover specific lubrication points for the servo, main flight controls, main rotor, transmission, engine, and tail flight control details.

2–10. Lubrication Requirements. Each part to be lubricated, as depicted on the lubrication chart, is indicated by a frequency symbol which shows the time interval between lubrications. Application symbols within the frequency symbols show how the lubricant is applied. A parts nomenclature key, referred to by a number adjacent to the frequency symbol, identifies the part to be lubricated. A code of either one, two, or three letters within the frequency symbol identifies the type of lubricant. Parts or areas to be lubricated on both sides of the helicopter are indicated by broken leader lines. If a part is to be lubricated in more than one place, the number of places is indicated in parentheses along the leader line. All symbols and codes are explained on sheet 1 of the lubrication chart.

THE SEASONAL GROUND TEMPERATURES ON WHICH THIS CHART IS BASED ARE AS FOLLOWS

NORMAL DAILY MINIMUM ABOVE –29 C (–20 F)

EXTREME LOW TEMPERATURE NORMAL DAILY TEMPERATURES BELOW –29 C (–20 F)



NOTE

A. LUBRICATE BEARINGS AT BOTH ENDS OF RODS

B. LUBR CATION PO NTS INDICATED WITH BROKEN LEADERS MUST BE LUBRICATED ON BOTH S DES OF HEL COPTER

LUBRICATION GUIDE

FREQUENCY SYMBOL

PARTS NOMENCLATURE KEY

1 TAIL ROTOR LINK RODS
2 TAIL ROTOR SPINDLE
3 COUNTERWE GHT ASSEMBLY
4. PYLON HINGE PINS
5 SERVICE PLATFORM H NGE
6 UPPER STRUT FITTING
7 SERVICE STEP HINGE ASSEMBLY
8 SLIDING WINDOW TRACK
9 COCKPIT SEAT
10 SLIDING WINDOW EMERGENCY RELEASE
11 SLIDING WINDOW LATCH
12 HARNESS REEL CABLE (ALL SEATS)
13 COCKPIT SEAT SUPPORT FITTINGS
14. NOSE DOOR LATCH
15 ENGINE OIL PRESSURE TRANSMITTING HOSE
16 NOSE DOOR CLOSED, HINGE PINS AND PISTON
17. NOSE DOOR HINGE
18 ENGINE OIL CELL
19 INBOARD AND OUTBOARD LEG FITTINGS
20. UPPER STRUT UNIVERSAL
21 LOWER STRUT UNIVERSAL
22 MAIN WHEEL BEARINGS
23 CARGO DOOR LATCH
24 CARGO HOOK INTERIOR PARTS
25 ACTUATOR ASSEMBLY SLIDING BUSHING PINS
26 CARGO SLING ASSEMBLY PINS AND SHACKLES
27 CARGO DOOR EMERGENCY RELEASE
28 BALL SCREW
29 EMERGENCY HATCH RELEASE
30 DRUM BEARINGS, GEARS BUSHINGS
31 CARGO DOOR TRACK
32 FORK BEARINGS
33 TAIL WHEEL BEARINGS
34 YOKE BUSHINGS
35 TAIL ROTOR HUB

APPLICATION SYMBOLS

OIL CAN GREASE GUN HAND

TABLE OF LUBRICANTS		
IDENT SYMBOL	SPECIFICATION	TYPE OF LUBRICANT
▲	MIL-C-16173	CORROSION PREVENTIVE COMPOUND
●	MIL G-21164	GREASE MOLYBDENUM DISULFIDE
▲	MIL-G 23827	GREASE AIRCRAFT AND INSTRUMENT
GO-75	MIL-L-2105	LUBRICATING OIL, GEAR
■	MIL-G-25537	GREASE A RCRAFT
◆	MIL-L-5020	LIQUID COMPASS
1100	MIL L-6082	LUBR CATING OIL AIRCRAFT
PE 2	MIL-L 21260	LUBRICATING OIL INTERNAL – COMBUST ON ENGINE
OGP	MIL L 7870	LUBRICATING OIL, GENERAL PURPOSE
OHA	MIL-H 5606	HYDRAULIC FLUID, PETROLEUM BASE
OHC	MIL-H 6083 TYPE I	HYDRAULIC FLUID PETROLEUM BASE

NOTE NO SPECIAL SERVICE NOTES

1 BEARINGS MUST BE PURGED BY APPLYING GREASE GUN TO FITTING UNTIL CLEAN GREASE COMES OUT PAST SEAL OR FROM RELIEF PASSAGES
2 LUBRICATE SHIELDED BEARINGS BY PUTTING SPECIAL FITTING ON ONE SIDE OF BEARING AND APPLYING GUN UNTIL CLEAN GREASE COMES OUT OTHER SIDE
3 APPLY GREASE SPARINGLY TO CONTACTING SURFACES
4 INSPECT AND REPLENISH DAILY, DRAIN AND REFILL EVERY 4TH INTER MEDIATE UNDER ADVERSE OPERATING CONDITIONS (DUSTY CONDITIONS COLD WEATHER OPERATION, ETC) MANDATORY OIL CHANGE WITH SYSTEM FLUSHING IS REQUIRED ANY TIME THE OIL SYSTEM IS CON TAM NATED
5 USE GRADE 1100 USING O L DILUTION SYSTEM DILUTE LUBRICANT AS NECESSARY FOR COLD WEATHER STARTING
6 OPERATE EMERGENCY RELEASE TO SEE THAT IT IS OPERATING PROPERLY, THEN REGREASE
7 LUBRICATE FULLY SEALED FAFNIR BEARINGS BY REMOVING SNAP RING AND COMPOSITION SEAL FROM ONE SIDE AND HAND PACKING REPLACE SEAL AND SNAP RING IF MARLEN–ROCKWELL CORPORATION (MRC) BEARINGS ARE INSTALLED, AS PYLON AND TAIL ROTOR DRIVE SHAFT BEARINGS, REMOVE AND REPLACE IN THE R ENT RETY IN LIEU OF RE LUBRICATING THEM DUE TO THE IMPRACTICALITY OF RELUBRICATING THESE BEARINGS WITHOUT DAMAGING THE SEALS
8 APPLY OIL BY MEANS OF A SQUIRT CAN TO THE SMALL LUBRICATING HOLES IN ACTUATING CYLINDER SUPPLY ENOUGH OIL TO THOROUGHLY SATURATE FELT WICKING
9 TO APPLY GREASE TO GEARS REMOVE STICK SUPPORT AND SHAFT FITTING TO EXPOSE GEARS. APPLY GREASE SPARINGLY TO SET OF GEARS
10 INSPECT DAMPERS DAILY AND REPLENISH IF NECESSARY F LL FLUID IN RESERVOIR TO FULL MARK HYDRAULIC FLUID MIL-H 6083, TYPE 1, MAY BE USED AS AN ALTERNATE FOR HYDRAULIC FLUID M L-H-5606 WITHOUT DRAINING DAMPERS. BOTH FLUIDS ARE COMPLETELY COM-PATIBLE WITH EACH OTHER AND EITHER MAY BE USED AS MAKE UP FLUID WHEN OPERATING IN DAMP AREAS OR WHEN AIRCRAFT IS FREQUENTLY IDLE, USE HYDRAULIC FLUID MIL-H-6083, TYPE 1, FOR BETTER MOISTURE DAMAGE PROTECTION
11 TO AVOID FORCING VERTICAL HINGE GREASE SEALS OUT OF H NGE RECESSES BY PRESSURE OF GREASE DURING LUBRICATION INSERT A "HORSE SHOE" SHAPED SHIM OF 0 015 INCH TH CKNESS BETWEEN HINGE AND EACH SPINDLE SHOULDER ALLOW TIME FOR PRESSURE TO DECREASE BEFORE REMOVING SHIM
12 LUBRICATE DAILY FOR FIRST INTERMEDIATE OF OPERATION AND EVERY INTERMEDIATE THEREAFTER
13 LUBRICATE AT FLUSH TYPE FITTINGS WITH NOZZLE, SHAFER PART NO N-2, OR EQUIVALENT
14 LUBRICATE SLEEVE SPINDLE ASSEMBLY W TH BLADES ATTACHED OTHERWISE, PRESSURE OF GREASE WILL FORCE CAP OFF APPLY GREASE SLOWLY UNTIL CLEAN GREASE COMES OUT PAST INBOARD SEAL WHEN BLADES ARE REMOVED INSTALL CAP RETAINER PART NO S1670-10408 AT INTERMEDIATE PURGE BY APPLYING GREASE UNT L CLEAN GREASE COMES OUT PAST INBOARD SEAL
15 USE THIS OIL DOWN TO –18 C (0 F). BELOW – 18 C (0 F) USE SAME OIL BUT APPLY AUXILIARY HEAT TO RA SE TEMPERATURE TO – 18 C (0 F) MINIMUM.
16 USE THIS OIL DOWN TO – 18 C (0 F). BELOW – 18 C (0 F) USE LUBRICAT-ING OIL, MILITARY SPECIFICATION MIL-L-25336 OR MIL-L-7808, OR USE LUBRICATING OIL, MILITARY SPEC FICATION MIL-L-21260, GRADE 2, BUT APPLY AUXILLARY HEAT TO RA SE TEMPERATURE TO – 18°C (0 F)
17 INSPECT AND REPLENISH DAILY W TH LUBRICATING OIL, MILITARY SPEC FICATION MIL L-2105, GRADE 80 LUBRICANT, DRAIN AND REFILL EVERY 2ND PERIODIC MIL-L-2105, GRADE 90 MAY BE USED AS AN ALTERNATE FOR LUBRICATING OIL, MILITARY SPECIF CATION MIL-L-2105, GRADE 80 BELOW – 32°C (–25°F) USE LUBRICAT NG OIL, M LITARY SPECIF CATION MIL-L-2105, GRADE 75. ROTATE FILLER PLUG FILL NG ON SPL NED FLANGE TO 2 O CLOCK POSITION. REMOVE P PE PLUG AND FILL KEEP THE F LLER HOLE AT 2 O'CLOCK POSITION REPLACE FILLER PLUG
18 INSPECT AND REPLENISH DAILY, DRAIN AND REFILL EVERY PERIOD C TO OBTAIN ACCURATE OIL LEVEL READING PRIOR TO F LL NG, ALLOW 1 2 HOUR MINIMUM FOR ENTRAPPED OIL TO DRA N FREE NTO GEAR BOX SUMP AFTER GEAR BOX OPERAT ON
19 HAND PACK BEARINGS ONLY 1 3 TO 1 2 FULL
20 INSPECT AND REPLENISH DAILY, DRAIN AND REFILL EVERY 4TH INTERMEDIATE
21 CLEAN WHEEL BEARINGS WITH DRY CLEANING SOLVENT, FEDERAL SPEC FICAT ON P-D-680, AND LUBRICATE AFTER EVERY HELICOPTER WASHING WHEEL REMOVAL, AND WHEN THE WHEEL BEARINGS HAVE BEEN EXPOSED TO AN ABNORMAL QUANT TY OF MOISTURE OR CLEANING SOLVENT
22 APPLY GREASE SLOWLY TO AVO D BLOWING OUT SEALS
23 REPLACE SH ELDED BEARINGS WITH SEALED BEARINGS AT 4TH NTERMEDIATE, OR WITH SHIELDED BEAR NGS IF SEALED BEAR NGS ARE NOT AVA LABLE. THE LETTER A AFTER JOY FAN PART NO IND CATES SEALED BEARINGS USED PESCO FANS USE, ONLY, SEALED BEARINGS LUBRICATE SEALED BEARINGS BY HYPODERMIC NEEDLE
24 FILL CAVITY OF FEMALE SPLINE SUCH THAT COMPLETE LUBRICATION OF SPLINE OCCURS WHEN GENERATOR IS ASSEMBLED TO TRANSMISS ON
25 INSPECT AND REPLENISH DAILY IF NECESSARY DRA N AND REFILL AT OVERHALL
26 FOR OPERATION BELOW – 12°C (10 F), DRAIN ENGINE OIL FROM EN GINE OIL PRESSURE TRANSMITTER HOSE AND REFILL W TH COMPASS LIQUID, MILITARY SPEC F CATION MIL-L-5020
27 USE ADAPTER ASSEMBLY, PART NO S1670-10629, TO LUBRICATE D SCONNECT COUPL NG SPLINES
28 IF ENGINE IS TO REMAIN IDLE FOR LONGER THAN 24 HOURS, M X ONE PART CORROSION PREVENTIVE COMPOUND, MILITARY SPECIFI-CATION MIL-C-6529 TYPE 2, WITH THREE PARTS ENGINE LUBRICATING OIL INJECT ONE P NT OF MIXTURE INTO PROPELLER THRUST BEARING CAVITY THROUGH ENGINE ANTICORROSION FITT NG ON CONTRAVANE ASSEMBLY REPEAT EVERY SEVENTH DAY WHILE ENGINE REMAINS IDLE
29 IN EXTREME ADVERSE CLIMATIC CONDITIONS THE REMOVAL OF GR T, SAND, AND ANY OTHER ABRASIVE FOREIGN MATERIAL AS WELL AS RE-LUBRICATION SHOULD BE MORE FREQUENT

Figure 2–1. Lubrication chart (Sheet 1 of 7)

MAIN FLIGHT CONTROL DETAIL

36 PILOT'S PITCH STICK
37 PUSH PULL ROD
38 PITCH ROD
39 SHAFT
40 PITCH STICK SHAFT BEVEL GEARS
41 STICK SUPPORT
42 TORQUE SHAFT BRACKET
43 ROD ASSEMBLY
44 STICK YOKE
45 FORCE GRADIENT CYLINDER ROD ENDS
46 FORCE GRADIENT CYLINDER ROD END
47 BELL CRANK
48 PUSH PULL ROD
49 BELL CRANK
50 ROD ASSEMBLY
51 PUSH PULL ROD
52 ROD ASSEMBLY
53 SOCKET AND YOKE ROD END AND ROLLER BEARINGS
54 SOCKET AND YOKE ROD END
55 STICK SUPPORT
56 BELL CRANK
57 ROD ASSEMBLY

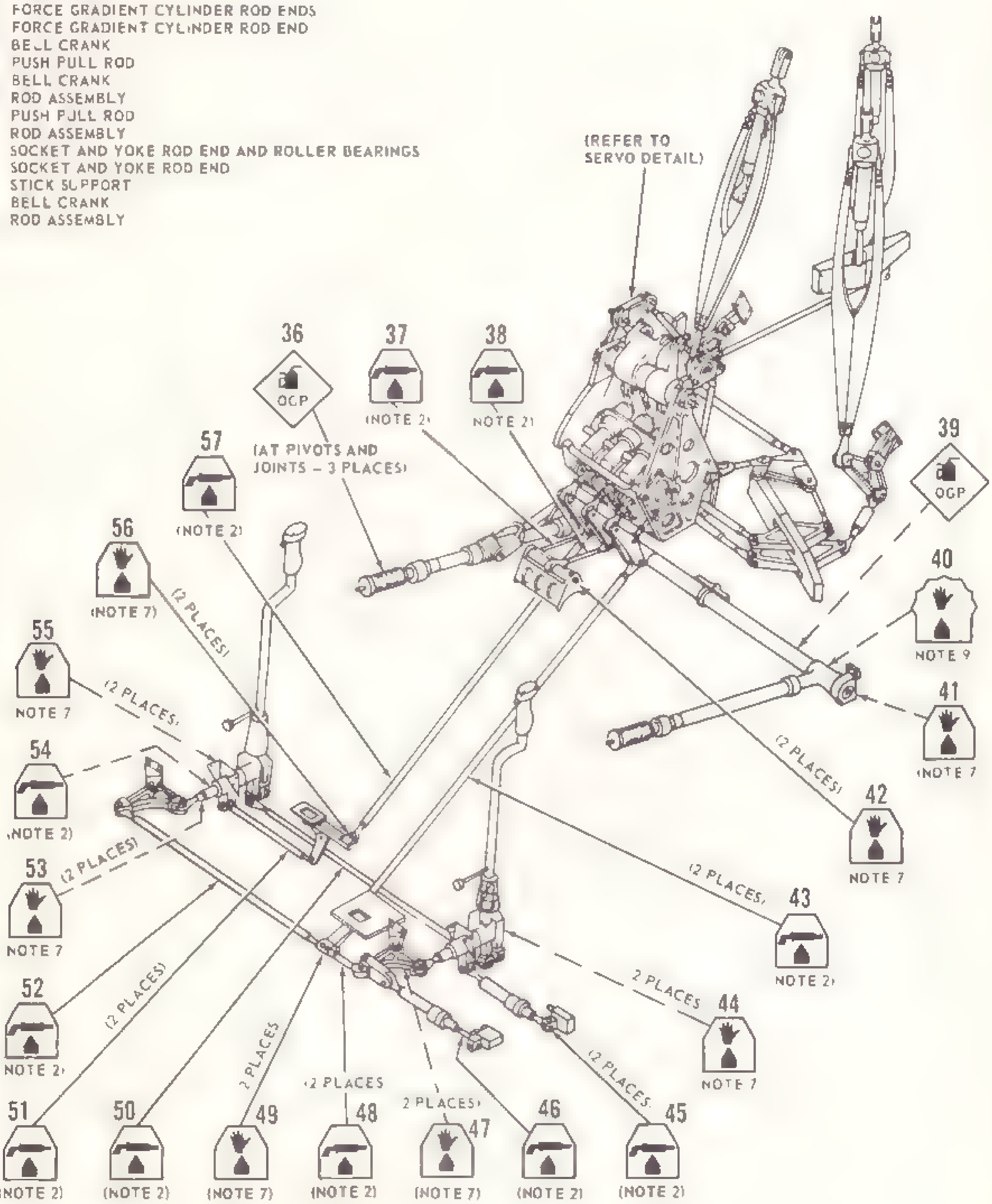


Figure 2–1. Lubrication chart (Sheet 2 of 7)

58. ROD
59. SERVO CYLINDER HOUSING
60. BELL CRANK
61. CONTROL ARM FITTING BEARINGS
62. PISTON RODS
63. SERVO UNIT ROD ENDS
64. BELL CRANK
65. ROD
66. SERVO ACTUATING CYLINDER ROD
67. MIXER RODS
68. BELL CRANK
69. ROD
70. BELL CRANK
71. RODS
72. CONTROL ARM ROD ENDS
73. BELL CRANK
74. RODS
75. BELL CRANKS
76. SERVO AND MIXER ROD
77. BELL CRANK
78. RODS
79. INPUT ARM ASSEMBLY
80. SERVO PISTON RODS
81. BRACKET ASSEMBLY BUSHING
82. MIXER BEARINGS
83. FELTS
84. PISTON RODS
85. MIXER BELL CRANK
86. SERVO AND MIXER ROD
87. MIXER BELL CRANK
88. BELL CRANK
89. MIXER BELL CRANK

SERVO DETAIL

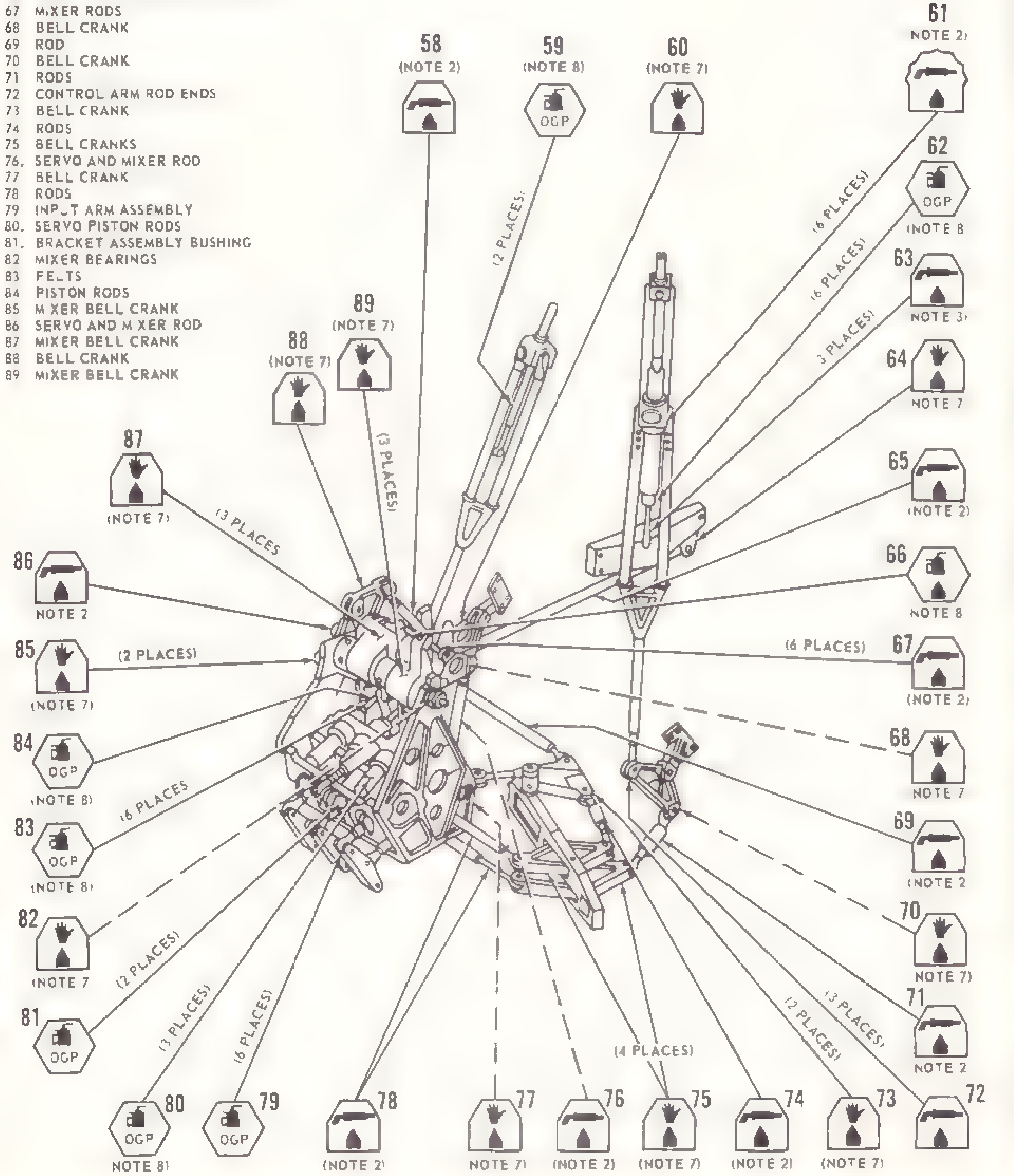
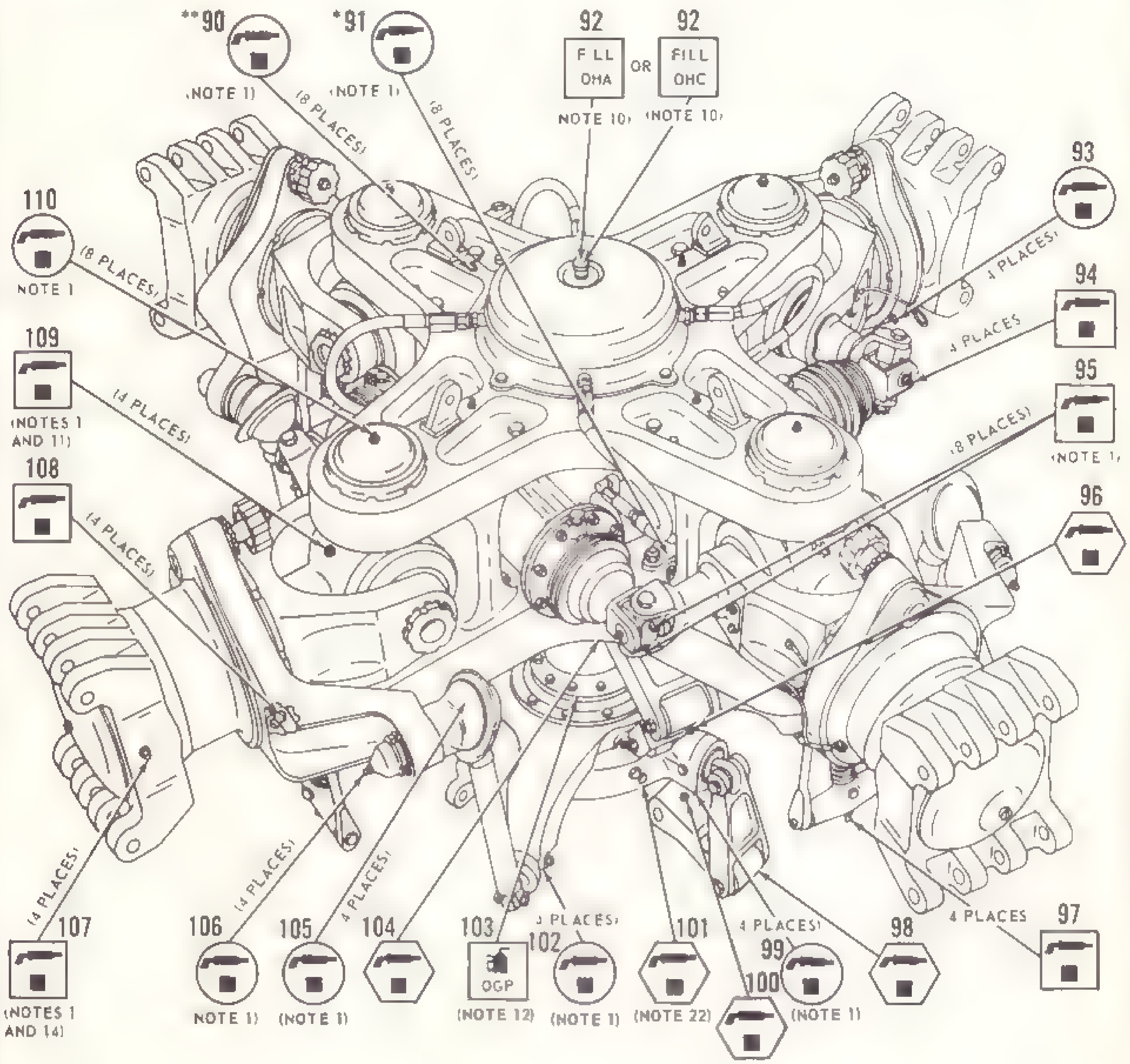


Figure 2–1. Lubrication chart (Sheet 3 of 7)

MAIN ROTOR DETAIL

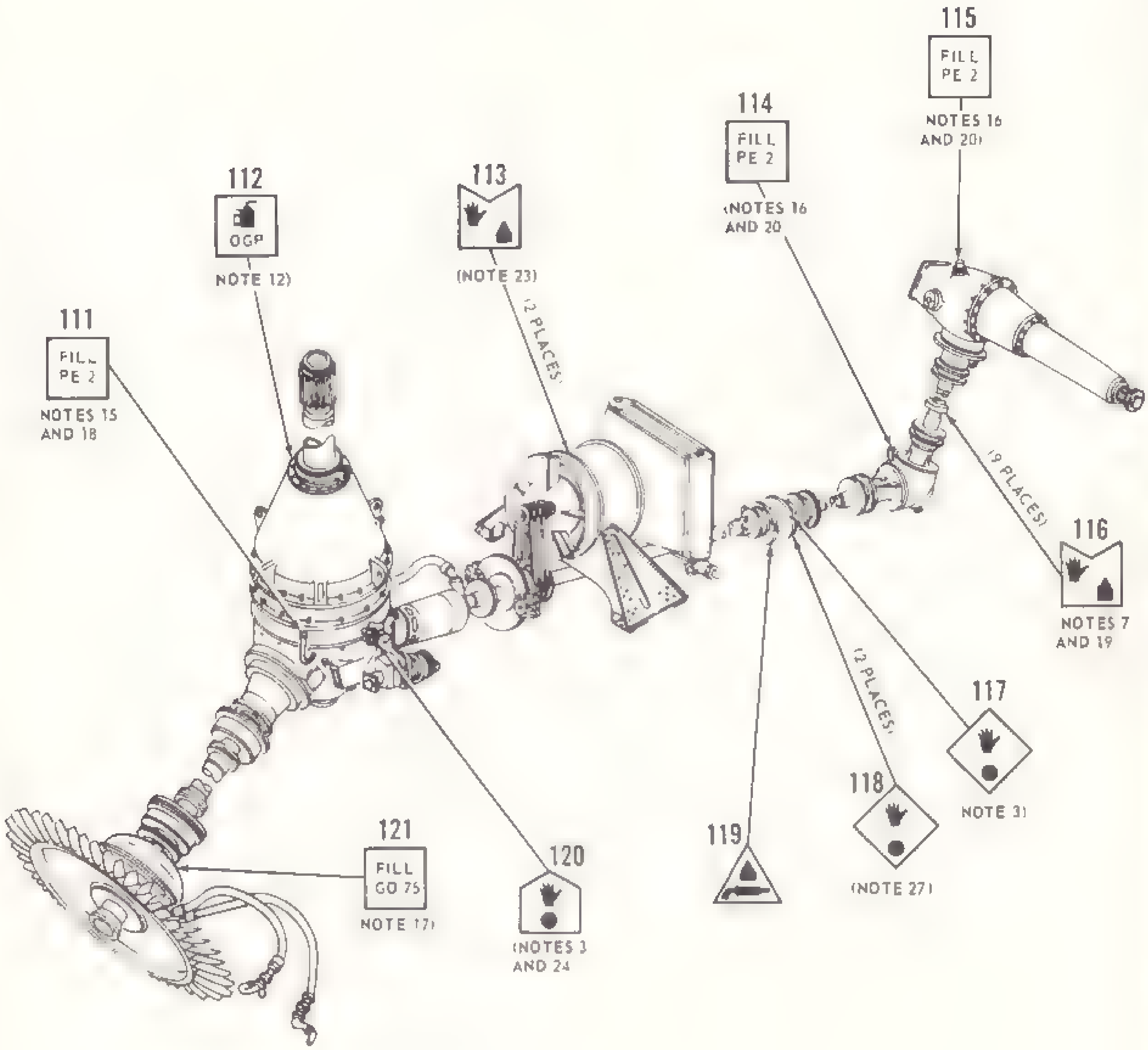
*SERIAL NO PRIOR TO 54-2914
**SERIAL NO 54 2914 AND SUBSEQUENT



90 UPPER AND LOWER PLATE ASSEMBLY
91 DAMPER BRACKET
92. DAMPERS FLUID TANK
93 HORN
94. DAMPER PIN
95 DAMPER TRUNNION
96. ROTATING SCISSORS LINK
97. ANTI-FLAPPING RESTRAINER
98 STATIONARY SCISSORS LINK
99. STATIONARY STAR TRUNNION BEARING
100 STATIONARY SCISSORS LINK
101 STATIONARY STAR ASSEMBLY
102 ROTATING STAR TRUNNION BEARING
103 ROTATING STAR BALL JOINT AND MAIN ROTOR SHAFT
104 ROTATING SCISSORS BRACKET
105. HORN TRUNNION YOKE
106 HORN BEARING
107. SLEEVE
108 ANTI-FLAPPING RESTRAINER HINGE FITTING
109 VERTICAL HINGE
110 HUB PLATE BEARINGS

Figure 2—1. Lubrication chart (Sheet 4 of 7)

TRANSMISSION DETAIL

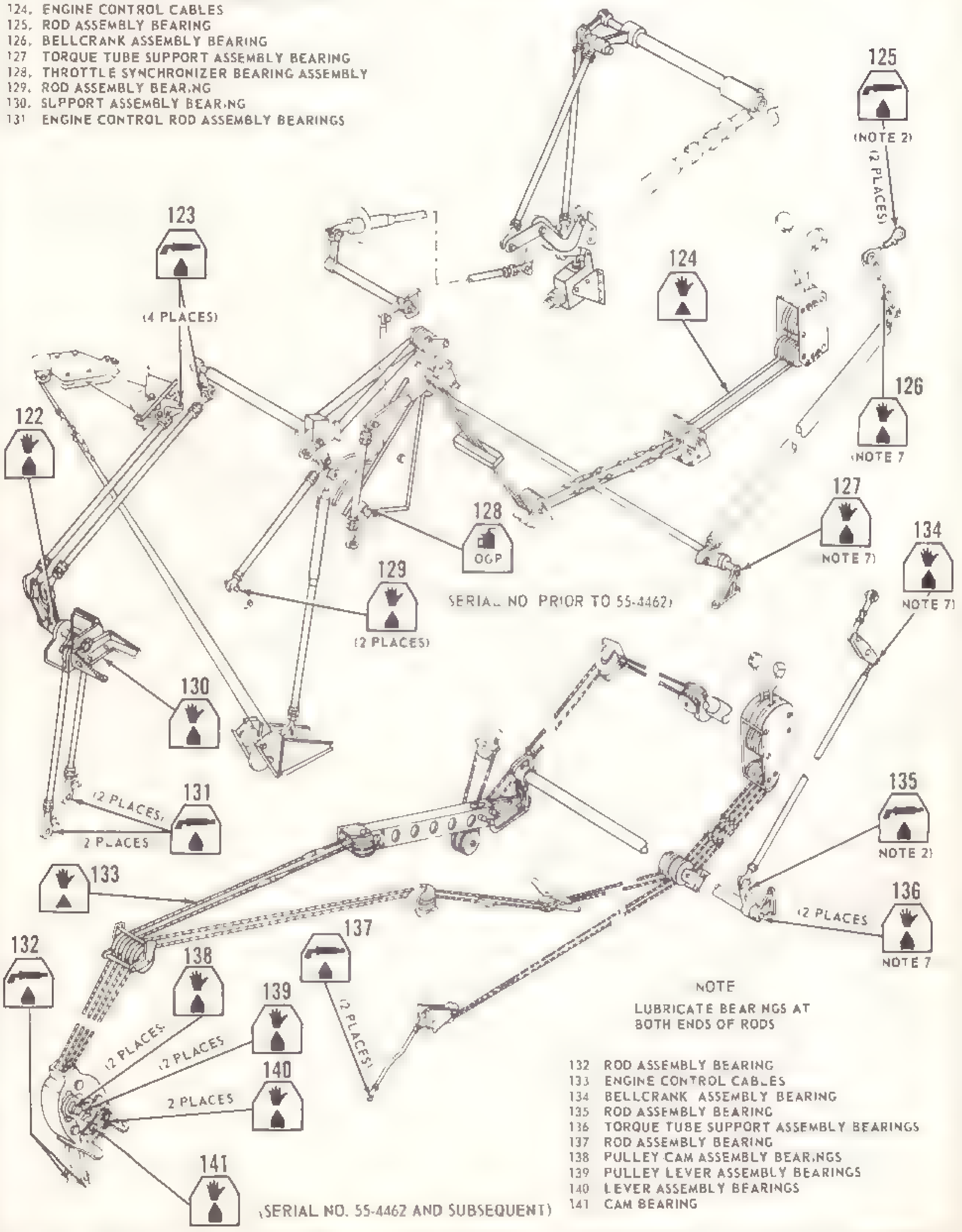


111 MAIN GEAR BOX
112 TOP SEAL
113 OIL COOLER BLOWER BEARINGS
114 INTERMEDIATE GEAR BOX
115. TAIL ROTOR GEAR BOX
116 PYLON AND TAIL ROTOR DRIVE SHAFT BEARINGS
117 DISCONNECT COUPLING RATCHET TEETH
118 DISCONNECT COUPLING SPLINES
119 DISCONNECT COUPLING BEARINGS
120 GENERATOR DRIVE SPLINES
121 HYDRO-MECHANICAL CLUTCH

Figure 2—1. Lubrication chart (Sheet 5 of 7)

122. HOUSING ASSEMBLY BEARING
123. ENGINE CONTROL ROD ASSEMBLY BEARINGS
124. ENGINE CONTROL CABLES
125. ROD ASSEMBLY BEARING
126. BELLCRANK ASSEMBLY BEARING
127. TORQUE TUBE SUPPORT ASSEMBLY BEARING
128. THROTTLE SYNCHRONIZER BEARING ASSEMBLY
129. ROD ASSEMBLY BEARING
130. SUPPORT ASSEMBLY BEARING
131. ENGINE CONTROL ROD ASSEMBLY BEARINGS

ENGINE CONTROLS DETAIL



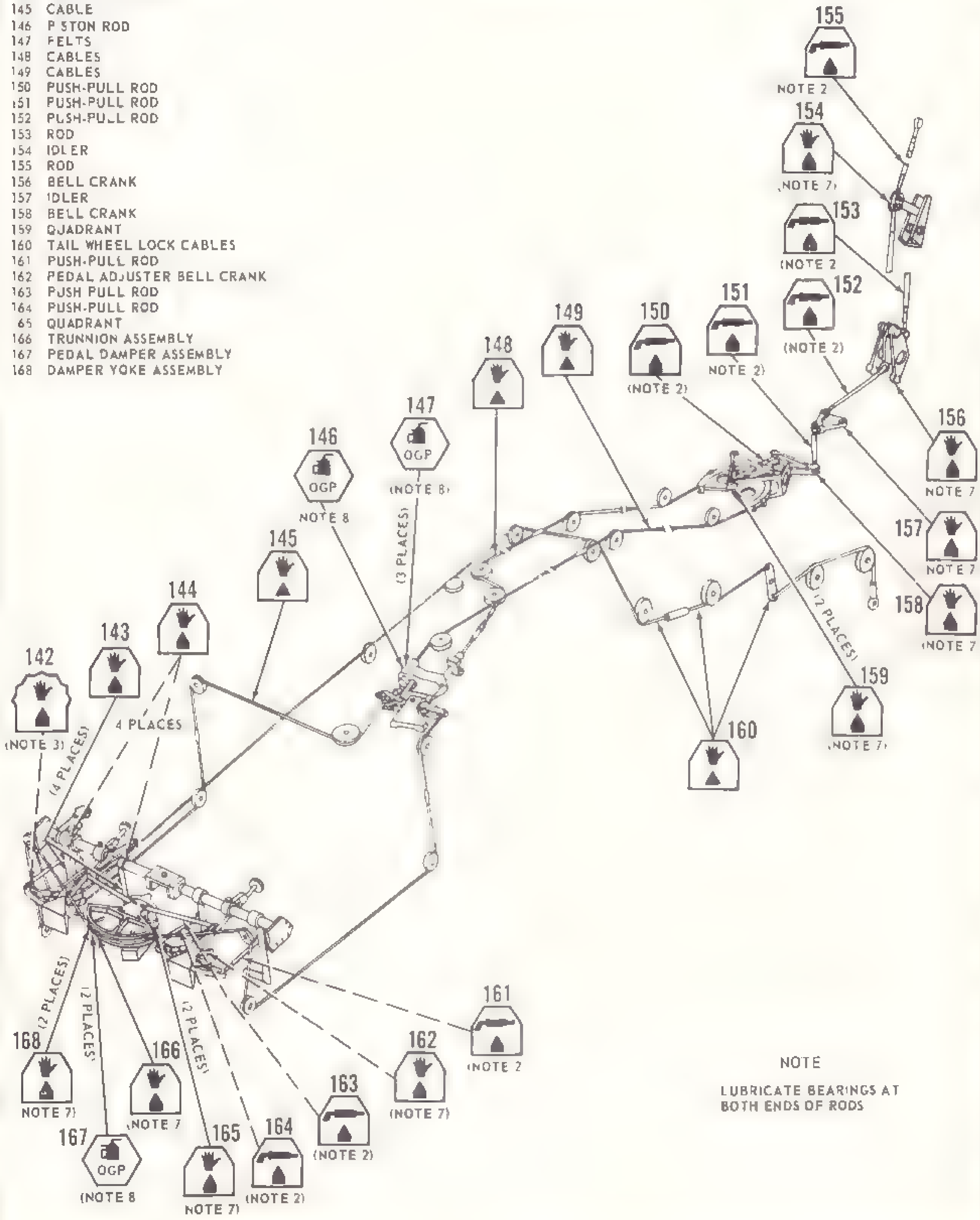
NOTE
LUBRICATE BEARINGS AT BOTH ENDS OF RODS

132 ROD ASSEMBLY BEARING
133 ENGINE CONTROL CABLES
134 BELLCRANK ASSEMBLY BEARING
135 ROD ASSEMBLY BEARING
136 TORQUE TUBE SUPPORT ASSEMBLY BEARINGS
137 ROD ASSEMBLY BEARING
138 PULLEY CAM ASSEMBLY BEARINGS
139 PULLEY LEVER ASSEMBLY BEARINGS
140 LEVER ASSEMBLY BEARINGS
141 CAM BEARING

Figure 2–1. Lubrication chart (Sheet 6 of 7)

142. PEDAL ADJUSTER YOKE
143 P LOT S TOE BRAKE
144 PEDAL BEARINGS
145 CABLE
146 P STON ROD
147 FELTS
148 CABLES
149 CABLES
150 PUSH-PULL ROD
151 PUSH-PULL ROD
152 PUSH-PULL ROD
153 ROD
154 IDLER
155 ROD
156 BELL CRANK
157 IDLER
158 BELL CRANK
159 QUADRANT
160 TAIL WHEEL LOCK CABLES
161 PUSH-PULL ROD
162 PEDAL ADJUSTER BELL CRANK
163 PUSH PULL ROD
164 PUSH-PULL ROD
65 QUADRANT
166 TRUNNION ASSEMBLY
167 PEDAL DAMPER ASSEMBLY
168 DAMPER YOKE ASSEMBLY

TAIL FLIGHT CONTROL DETAIL



NOTE

LUBRICATE BEARINGS AT BOTH ENDS OF RODS

Figure 2–1. Lubrication chart (Sheet 7 of 7)

CHAPTER 3

INSPECTION REQUIREMENTS

Section I General Information and Scope

3–1. General Information. This chapter contains complete requirements for the special inspection, test flight inspections, test flight, overhaul and retirement schedule, and standards of serviceability applicable to the CH-34 helicopter. Equipment serviceability criteria applicable to the CH-34 helicopter are presented in TM 55-1520-202-ESC. This chapter does not contain instructions for repair, adjustment, or other means of rectifying conditions, nor does it contain instructions for troubleshooting to find causes for malfunctioning. Applicable chapters covering the appropriate systems and higher echelon assistance should be consulted for instructions that are beyond the scope of this chapter.

3–2. Scope. The inspections prescribed in this chapter will be accomplished at specified periods by organizational maintenance activities with assistance of direct support maintenance activities when required. The following conditions will be noted during the performance of the inspections.

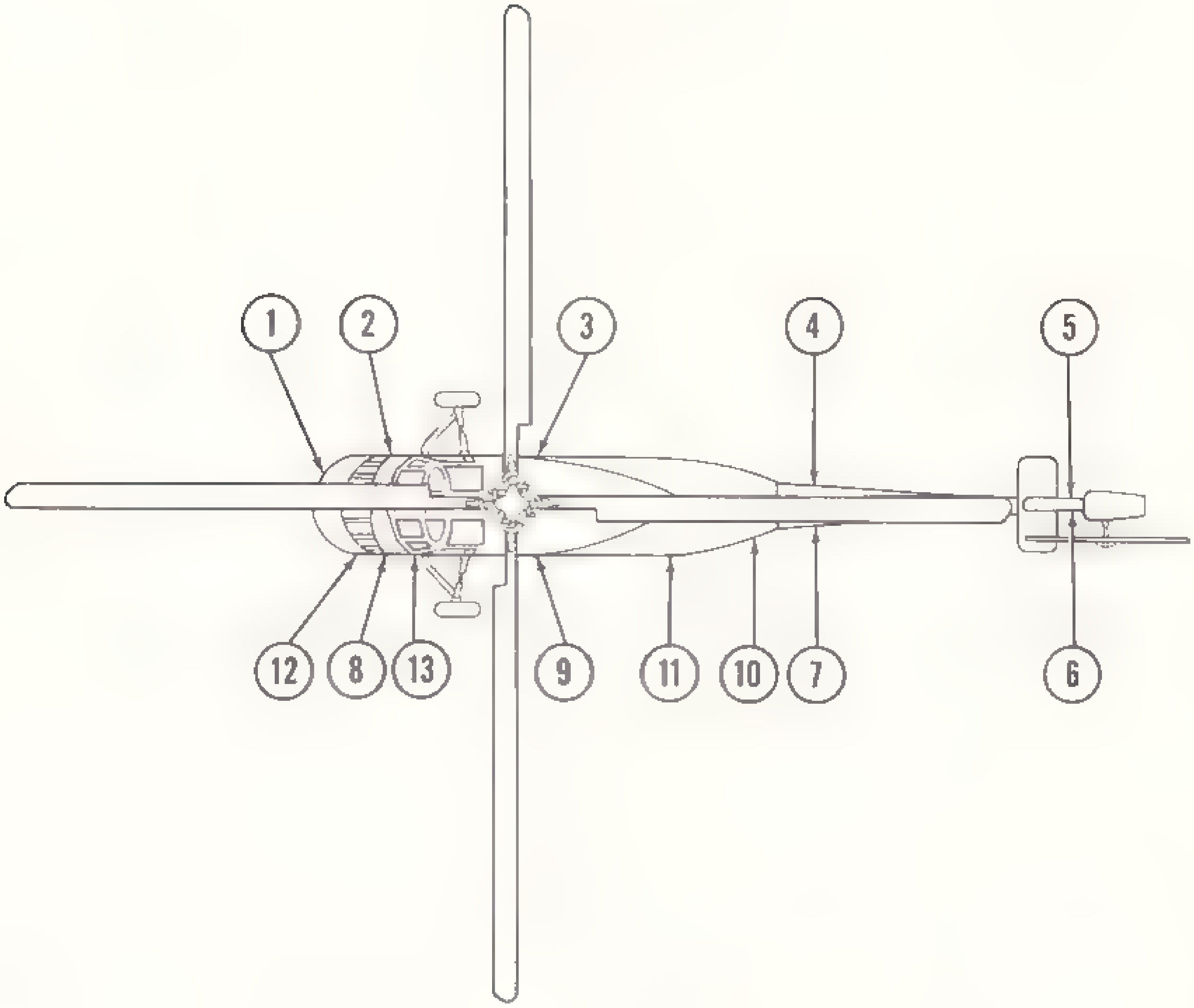
a. The inspection requirements are stated in such a manner as to establish what and when certain equipment is to be inspected and the condition to be sought. Compliance with the provisions outlined herein and with the Preventive Maintenance Inspection Checklists (TM 55-1520-202-20PMD, -20PMI, and -20PMP) is required in order to assure that latent defects are discovered and corrected before malfunctioning or serious trouble results. In order to arrange inspection requirements as nearly as possible according to the manner in which work will be assigned, the requirements in each section are divided into groups under area headings. (See figure 1–1.) This figure will be the same as the area diagram presented in the appropriate Preventive Maintenance Inspection Checklist. An area title indicates a specific helicopter location which may be comprised of several systems or groups of related components within this given area.

b. Inspection methods employed; environmental and geographical conditions; availability of specialized, skilled, or semi-skilled manpower; and facilities utilized are extremely variable; therefore, flexibility is provided with respect to the order of performance of the various inspections as required by efficient management of the inspection function assuring that the inspection requirements designated are adhered to and accomplished.

c. This chapter pertains to all CH-34 helicopters and may therefore contain inspection requirements applicable to specific equipment not installed on individual helicopters. When this situation is encountered, those requirements that are not applicable should be disregarded.

d. The inspection requirements for the special and test flight inspections are printed on inspection checksheets which will be locally reproduced and utilized while performing the respective inspection.

e. Revisions to this chapter shall be published when necessary to add, delete, revise, or change data. Frequency of revisions will be based on factual data accumulated as a result of maintenance experience. Data will be gathered by field studies, from equipment improvement recommendations, and from any other communications pertaining to this chapter and its requirements. Recommendations proposing changes to this chapter should be submitted on DA Form 2028 and forwarded to the Commanding General, U. S. Army Aviation Materiel Command, ATTN: SMOSM-M, P.O. Box 209, Main Office, St. Louis, Missouri 63166.



AREA NO.	LOCATION	AREA NO.	LOCATION
1	ENGINE COMPARTMENT	8	LOWER FUSELAGE AND LANDING GEAR LH (INCLUDING BOTTOM SECTION)
2	LOWER FUSELAGE AND LANDING GEAR RH (EXCLUDING BOTTOM SECTION)	9	UPPER FUSELAGE AND SERVICE PLATFORM LH
3	UPPER FUSELAGE AND SERVICE PLATFORM RH	10	ELECTRONICS COMPARTMENT (INTERIOR)
4	TAIL CONE RH	11	CABIN SECTION (INTERIOR)
5	PYLON RH (INTERIOR AND EXTERIOR)	12	CLUTCH COMPARTMENT
6	PYLON LH (INTERIOR AND EXTERIOR)	13	COCKPIT SECTION
7	TAIL CONE LH		

Figure 3—1. Area diagram

Section II Special Inspection

3–3. Definition and General Information. This section supplements the scheduled inspections as outlined in the Preventive Maintenance Inspection Checklists in TM 55-1520-202-20PMD, -20PMI, and -20PMP to include inspection of items which are required to be inspected at intervals not compatible with airframe operating time or airframe inspection intervals. Typical of this type inspection items are:

a. Inspection which is contingent upon specific conditions or incidents that arise, and only because of these conditions or incidents, immediate inspection is required to insure further safe flight; such as, hard landings, overspeed, sudden stoppage, etc.

b. Inspection of components or airframe, on a calendar basis; such as, safety belts, first aid kits, weight and balance check, aircraft inventory, etc. This type inspection will be accomplished during the nearest intermediate or periodic inspection.

c. Specific definitive inspections on aircraft engines based strictly upon engine operating time.

d. When special inspection items become due and are performed, the applicable forms, records, and worksheets pertaining thereto will be completed and updated as required (TM 38-750).

3–4. Requirements. Items such as hard landings, overspeed, sudden stoppage, etc, which qualify under the criteria of paragraph 3–3, make up the requirements of special inspection. These requirements are grouped under area headings in a columnar listing on the Aircraft Inspection Checksheet.

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 1	NO. OF PAGES 11
AIRCRAFT AND SERIAL NO.	INSPECTION NO.	DATE OF INSPECTION	

AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
1	ENGINE OVERSPEED IN EXCESS OF 3000 RPM:			
		a. Replace engine.		
		b. Inspect the engine cooling fan assembly for elongation of the fan blades, and elongation of the attachment holes in the fan blades and disc; and fan blade attaching rings for cracks and distortion.		
		c. Check for specified clearance (0.052 to 0.103 inch) between the engine cooling fan blade tips and the contravane assembly.		
1	ENGINE OVERSPEED BETWEEN 2900 and 3000 RPM. (Momentary overspeed or surge within the 2900 to 3000 RPM range under full throttle opening resulting from an abnormally fast throttle movement is permissible without subsequently performing the following inspection. However, unusually fast throttle movement to the full open position should be avoided whenever possible.) Perform the following:			
		a. Inspect pressure oil strainer (supercharger rear housing) for excessive metal particles.		
		b. Check valve clearances to determine whether or not any valve stretching occurred due to abnormal operation. Replace any cylinder in which the normal valve clearance (0.010–0.017 inch) is reduced by 40 percent.		
		c. Check all valve adjusting screws for correct torque (250–300 inch-pounds).		
		d. Perform a compression check on all cylinders. Replace any cylinders that show a compression loss greater than 35 percent.		
		e. Perform a boroscope inspection on all cylinders.		
		f. Spark plugs removed for the above inspections may be reused provided each plug does not exhibit any of the physical or structural defects listed below under engine overboost, subparagraph *c*.		
		g. Check all spark plug lead coupling nuts for correct torque (165–175 inch-pounds).		
		h. Inspect cylinder heads and barrels for cracks and all cylinder holddown capscrews for correct torque (575–600 inch-pounds) and loss of palnuts to the extent possible without removal of the engine from the helicopter.		
		i. Inspect all fuel, oil, and hydraulic connections to the engine for evidence of leakage and looseness.		
		j. Inspect strainers (front oil pump, rocker box drain oil sump, and supercharger rear housing) and magnetic chip detectors (front oil sump and supercharger rear housing) for excessive metal particles after performing the following ground run (observe all existing precautionary measures during ground run):		
		(1) 1000–1200 RPM–30 minutes.		
		(2) 1200 RPM–10 minutes with short bursts to 1800 RPM.		
		(3) Full power for 2–3 minutes.		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 2	NO. OF PAGES 11
AIRCRAFT AND SERIAL NO.	INSPECTION NO.	DATE OF INSPECTION	

AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
1		ENGINE OVERBOOST AT POWER SETTINGS ABOVE 2500 RPM OF MORE THAN 2 INCHES (HG) ABOVE THE MAXIMUM ALLOWABLE MANIFOLD PRESSURE FOR ANY PERIOD OF TIME, OR LESS THAN 2 INCHES (HG) ABOVE THE MAXIMUM ALLOWABLE MANIFOLD PRESSURE FOR MORE THAN 15 SECONDS. ENGINE OVERBOOST AT POWER SETTING BETWEEN 2201 TO 2500 RPM OF MORE THAN 6 INCHES (HG) ABOVE THE MAXIMUM ALLOWABLE MANIFOLD PRESSURE FOR ANY PERIOD OF TIME, OR LESS THAN 6 INCHES (HG) ABOVE THE MAXIMUM ALLOWABLE MANIFOLD PRESSURE FOR ANY PERIOD OF TIME, OR LESS THAN 6 INCHES (HG) ABOVE THE MAXIMUM ALLOWABLE MANIFOLD PRESSURE FOR MORE THAN 15 SECONDS. (No manifold pressure or time limitations apply to power settings of 2200 RPM and below.) Perform the following: *a.* Perform a boroscope inspection on all cylinders. *b.* Perform a compression check on all cylinders. *c.* Sparkplugs removed for the above inspections may be reused provided each plug does not exhibit any of the following physical and or structural defects: (1) Ground or center electrodes show signs of metal impact damage. (2) Copper runout of the inner core of the center electrode.—Damage to the outer sheath and bridging of the electrode gaps will accompany this condition. (Erosion of the copper inner core at the open end of the center electrode is to be expected and is not abnormal. (3) Ruptured outer sheath of a fully inclosed copper center electrode. (4) Lost center or side wires (fine wire spark plug). (5) Ceramic core nose with cracks (none permitted). (6) Ceramic core nose displaying an ash gray color (signs of high cylinder temperatures). (7) Ceramic core nose surface having a crazing effect (sign of detonation). (8) Misshaped copper gaskets, and/or surface indentation of more than 0.005 inch (indications of overtightening).		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 3	NO. OF PAGES 11
AIRCRAFT AND SERIAL NO.	INSPECTION NO.	DATE OF INSPECTION	

AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
		(9) Damaged hexagon section of the spark plug shell (signs of misfitting tools, causing off-angular torque loads). A possible incipient structural failure may be expected.		
		(10) Damaged ignition lead coupling nut showing severe impact.		
		(11) Other probable causes should be looked for since above conditions represent only known cases that have caused spark plug failure. (Any used spark plug returned to service should have a new gasket installed.)		
		d. Inspect engine for cracked or broken cylinder heads or barrels.		
		e. Inspect all intake pipes, gaskets, and seals for leakage.		
		f. Remove magnetic plugs and removable oil screens, and thoroughly inspect for excessive metal particles.		
		g. Drain oil from sumps and thoroughly inspect for excessive metal particles.		
1	FIRST, FIFTH, AND TENTH OPERATING HOURS AFTER INSPECTION OF ENGINE DUE TO OVERSPEED OR OVERBOOST			
		Remove magnetic plug and removable oil screens, and thoroughly inspect for excessive metal particles.		
1	AT ENGINE CHANGE	Perform the following:		
		a. Main drive shaft removed and inspected as follows:		
		(1) Flange (part No. S1635-92006) and drive shaft (part No. S1635-92005) for cracks (fluorescent or dye penetrant).		
		(2) All flanges for elongation of bolt holes beyond specific limits.		
		(3) Drive shaft for scratches or scoring beyond specific limits.		
		(4) Rubber couplings for bond separation beyond specified limits; coupling flanges for cracks and elongated bolt holes.		
		b. Engine mount support arms for cracks and corrosion (fluorescent or dye penetrant); shields, clamps, braces, and attaching bolts and nuts for security.		
		c. Engine vibration isolators for deterioration of rubber core and security.		
		d. Entire engine oil system drained, flushed, and refilled.		
		e. Anti-friction bearings, commonly called rod-end bearings, bellcrank bearings, control pulley bearings, and cable end fittings for roughness, wear, corrosion, alignment, security, and deterioration or lack of lubricant.		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 4	NO. OF PAGES 11
AIRCRAFT AND SERIAL NO.	INSPECTION NO.	DATE OF INSPECTION	

AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
		f. Fire detector circuits for specified resistance and open or grounded condition (ohmmeter) and correct polarity (milliammeter or millivoltmeter); fire detector system for operation (actuate test switch; hold ON 5 to 15 seconds).		
		g. Inspect 3/16- or 1/4-inch nuts securing engine mount support fitting to fuselage for 35 to 45 and 115 to 125 inch-pounds torque respectively (helicopter serial No. prior to 55-4501).		
		h. Remove and inspect magnesium oil cell sump fitting assembly, part No. S1630-63041-5 (round), for corrosion.		
		i. Engine shaft nut, clamping ring, fan hub assembly, fan disc, upper and lower rings, blade attachment bolts, fan blades, and spacers for cracks or damage. (Magnetic particle and fluorescent penetrant inspection.)		
		j. Bronze centering cones for galling or evidence of hub rocking on cones.		
		k. Fan disc hub splines and engine shaft splines for cracks, corrosion, or galling.		
1	AT ENGINE CHANGE RESULTING FROM INTERNAL ENGINE FAILURE. Perform the following:			
		a. Perform steps *a* through *c* and *e* through *k* under AT ENGINE CHANGE.		
		b. Engine oil tank removed and cleaned.		
		c. Fittings, sump, and all component parts cleaned.		
		d. Oil cooler and regulator replaced.		
		e. Hydro-mechanical clutch assembly replaced.		
1	AFTER GROUND RUN FOLLOWING ENGINE OR CYLINDER CHANGE Perform the following:			
		a. Cylinder holddown cap screws for proper safe tie.		
		b. Manifolds, fuel, oil, and hydraulic lines for evidence of leakage and security.		
		c. Sump plugs and oil screens removed and inspected for metal particles.		
1	AFTER FLIGHT TEST FOLLOWING ENGINE OR CYLINDER CHANGE Inspect the following:			
		a. Cylinder holddown cap screws for proper safe tie.		
		b. Manifolds, fuel, oil, and hydraulic lines for evidence of leakage and security.		
		c. Sump plugs and oil screens removed and inspected for metal particles.		
1	AFTER VIOLENT ENGINE BACKFIRE THROUGH THE INDUCTION SYSTEM			
		Inspect entire induction system for obvious damage and security.		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 5	NO. OF PAGES 11
AIRCRAFT AND SERIAL NO.	INSPECTION NO.	DATE OF INSPECTION	

AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
1	AFTER FIRST OIL DILUTION AT START OF COLD WEATHER OPERATIONS WHEN PERIODIC OIL DILUTION IS NOT USED			
		Remove, inspect, and clean magnetic chip detector plugs, oil sump strainers, and oil screen after 1 or 2 hours of operation and at short intervals thereafter until no evidence of sludge is noted.		
1	SECOND HOUR OF ENGINE OPERATION AFTER ANY COMPONENT OF EXHAUST SYSTEM HAS BEEN CHANGED			
		Sleeve-type clamps on exhaust collector for specified tightness.		
1	ONE HOUR AFTER LAST FLIGHT IN AREAS WHERE GROUND TEMPERATURES ARE AT OR BELOW FREEZING			
		Drain engine oil tank sump.		
2, 4, and 8	WHEN CIRCUMSTANCES WHICH COULD RESULT IN POSSIBLE LANDING GEAR DAMAGE ARE REPORTED BY FLIGHT CREW AND WHEN THERE IS ANY EVIDENCE OF DAMAGE TO WHEELS Perform the following:			
		a. Tires removed from wheels and inspected for breaks. *b.* Wheels inspected for cracks or distortion. *c.* Landing gear components and areas of attachment inspected for cracks and distortion.		
3, 9, 12, and 13	AFTER EACH PARTIAL OR COMPLETE LOSS OF SERVO CONTROL			
		Inspect flight control rods and/or pulley attachment brackets between servo units and mixing unit for bent rod ends, distortion, and security.		
3, 5, 6, 10, and 11	WHEN ANY ABNORMAL MANEUVER IS REPORTED BY THE PILOTS Tail rotor drive shaft removed and inspected as follows:			
		a. Drive shaft and flanges for cracks (fluorescent or dye-penetrant method). *b.* All flanges for elongated bolt holes. *c.* Rubber couplings for bond separation beyond specified limits; coupling flanges for elongated bolt holes. *d.* Bearing housings for bond separation or tears in rubber. *e.* Drive shafts for alignment between bearings within specified limits (installed and connected on helicopter). *f.* Disconnect coupling. Inspect and repair as necessary.		
All Areas	WHEN MAIN ROTOR OVERSPEEDS OVER 310 RPM Perform the following:			
		a. Main and tail rotor blades removed; condemn, and scrap locally.		

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AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
		b. Tail rotor assembly and counterweight assembly removed; condemn, and scrap locally.		
		c. Visually inspect control linkage for damage and distortion.		
		d. Remove main rotor head assembly. Return star assembly, dampers, and rotating and stationary scissors for overhaul. Condemn and scrap locally main rotor hub assembly.		
		e. Inspect for elongation of clutch fan blades, attachment holes in blades and disc; fan blade attaching rings for cracks and distortion.		
		f. Check for specified clearance (0.052 to 0.103 inch) between fan blade tips and contravane assembly.		
		g. Remove main rotor drive shaft and inspect the following:		
		(1) Drive shaft and flanges for cracks (fluorescent or dye penetrant).		
		(2) All flanges for elongated bolt holes.		
		(3) Rubber couplings for bond separations beyond specified limits; coupling flanges for cracks and elongated bolt holes.		
		h. Remove tail rotor drive shaft (all sections) and inspect the following:		
		(1) Drive shaft and flanges for cracks (fluorescent or dye penetrant).		
		(2) All flanges for elongated bolt holes.		
		(3) Rubber couplings for bond separations beyond specified limits; coupling flanges for cracks and elongated bolt holes.		
		(4) Bearing housings for bond separations or tears in the rubber.		
		(5) Drive shafts for alignment between bearings within specified limits (installed and connected).		
		i. Tail rotor drive shaft disconnect coupling removed for overhaul.		
		j. Inspect magnetic plugs in main, intermediate, and tail rotor gear boxes for metal particles.		
3 and 11	AFTER OVERSPEED OF MAIN ROTOR AND FIVE FLYING HOURS FOLLOWING OVERSPEED OF MAIN ROTOR			
		Main gear box oil filter and magnetic sump plug removed and inspected for metal particles.		
3 and 9	WHEN BLADE STALL HAS BEEN REPORTED BY THE PILOT Inspect the following:			
		a. Flight control rods for distortion and proper alignment.		
		b. Main rotor head assembly for obvious damage; particular attention for cracks in the vicinity of the pitch control horns.		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 7	NO. OF PAGES 11
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AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
		c. Main rotor blades for obvious damage; particular attention to pockets for distortion.		
All Areas	WHEN MAIN ROTOR OVERSPEEDS BETWEEN 258 AND 270 RPM Inspect the following:			
		a. Main rotor blades for dents, cracks, and buckled pocket skin; bonded joints for separation beyond specified limits; tip block rivets for security; tip caps for distortion and loose screws.		
		b. Tail rotor blades for dents, cracks, distortion, and separation; particular attention for separation of bonding at spar and trailing edge.		
		c. Main rotor head assembly, tail rotor assembly, and tail rotor counterweight assembly for damage or distortion indicating yield of material; control linkages for damages or distortion.		
		d. Main and tail drive shafts for damage or distortion; tail drive shaft brackets for cracks in area of attachment holes; rubber couplings for bond separations beyond specified limits.		
		e. Elongation of clutch fan blades, and attachment holes in blades and disc; fan blade attaching rings for cracks and distortion.		
		f. Check for specified clearance (0.052 to 0.103 inch) between fan blade tips and contravane assembly.		
		g. Magnetic plugs in main, intermediate, and tail gear boxes for metal particles.		
All Areas	WHEN MAIN ROTOR OVERSPEEDS BETWEEN 270 AND 310 RPM Inspect the following:			
		a. Main rotor blades for dents, cracks, and buckled pocket skin; bonded joints for separation beyond specified limits; tip block rivets for security; tip caps for distortion and loose screws.		
		b. Tail rotor blades for dents, cracks, and distortion; separation of bonding at spar and trailing edge.		
		c. Main rotor head assembly and tail rotor counterweight assembly for damage or distortion indicating yield of material; control linkages for damage or distortion.		
		d. Elongation of clutch fan blades, and attachment holes in blades and disc; fan blade attaching rings for cracks and distortion.		
		e. Check for specified clearance (0.052 to 0.103 inch) between fan blade tips and contravane assembly.		
		f. Main drive shaft removed and inspected as follows:		
		(1) Drive shaft and flanges for cracks (fluorescent or dye penetrant).		
		(2) All flanges for elongated bolt holes.		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 8	NO. OF PAGES 11
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AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
		(3) Rubber couplings for bond separations beyond specified limits; coupling flanges for cracks and elongated bolt holes.		
		g. Tail drive shaft removed (all sections) and inspect as follows:		
		(1) Drive shaft and flanges for cracks (fluorescent or dye penetrant).		
		(2) All flanges for elongated bolt holes.		
		(3) Rubber couplings for bond separations beyond specified limits; coupling flanges for cracks and elongated bolt holes.		
		(4) Bearing housings for bond separations or tears in the rubber.		
		(5) Drive shafts for alignment between bearings within specified limits. (Installed and connected on helicopter.)		
		h. Tail drive shaft disconnect coupling removed, inspected, and repaired (as necessary).		
		i. Magnetic plugs in main, intermediate, and tail gear boxes for metal particles.		
All Areas	AFTER EACH ABRUPT CLUTCH ENGAGEMENT OR SUDDEN STOPPAGE OF THE MAIN ROTOR FROM IMPACT (An abrupt clutch engagement is a severe shock load which is obviously noticeable throughout the helicopter.) Perform the following:			
		a. Inspect main, intermediate, and tail rotor gear box strainers and magnetic plugs for excessive metal particles.		
		b. Remove and replace clutch with a like serviceable item.		
		c. Inspect main rotor head as follows:		
		(1) Check damper connections and bolts for possible damage.		
		(2) Inspect damper stops.		
		d. Inspect main drive shaft as follows:		
		(1) Zyglo and detail inspect flanges.		
		(2) Bolt holes for possible distortion (deformation) and/or elongation.		
		e. Inspect tail rotor drive shaft (all sections) as follows:		
		(1) Dye check ends (4 inches).		
		(2) Detail inspect 0.625/0.624 inch diameter wedge and collet holes.		
		(3) Inspect for runout and alignment.		
		f. Perform the following on main rotor blades:		
		(1) Remove all main rotor blades from the helicopter and replace with like serviceable items.		
		(2) Annotate historical record (DA Form 2410) of each blade involved in an abrupt clutch engagement with the following:		
		(a) The fact that the blade was subjected to an abrupt clutch engagement.		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 9	NO. OF PAGES 11
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AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
		(b) Serial numbers of the other blades installed on the helicopter at the time of the incident.		
		(3) Blades involved in a sudden stoppage from impact incident, if damaged beyond the repair limitations shall be condemned and salvaged and/or scrapped locally.		
		g. Inspect tail rotor assembly as follows:		
		(1) Inspect tail rotor blades for possible buckling and bond separation.		
		(2) Magnaflux flapping hinge inner races. (Rotor does not have to be removed from the helicopter for this inspection.)		
All Areas	AFTER SUDDEN STOPPAGE OF TAIL ROTOR FROM IMPACT Inspect the following:			
		a. Main, intermediate, and tail rotor gear box strainers and magnetic plugs for excessive metal particles.		
		b. Inspect pylon-tail cone casting, tail cone, attaching points, and tail rotor control system for damage, distortion, and security.		
		c. Inspect tail rotor drive shaft as follows:		
		(1) For damage, alignment, and runout.		
		(2) Splined couplings for damage and cracks.		
		(3) Universal joint for possible shearing of attachment bolts.		
		d. Perform the following on tail rotor assembly:		
		(1) Replace tail rotor hub assembly and condemn, salvage, and/or scrap locally.		
		(2) Replace tail rotor blades and condemn, salvage, and/or scrap locally if damaged beyond repair limitations.		
3	ONE HOUR OF OPERATION AFTER THE MAIN ROTOR HEAD ASSEMBLY HAS BEEN INSTALLED			
		Main rotor hub locknut for specified torque (2000 to 2500 foot-pounds).		
3	MAIN GEAR BOX REPLACEMENT Inspect the following:			
		a. Tail rotor drive shaft to rotor brake drum attaching bolts for cracks or other damage (magnetic particle).		
		b. Main gear box supports removed and inspected for cracks (magnetic particle).		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 10	NO. OF PAGES 11
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AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
3	MAIN GEAR BOX REPLACEMENT AS A RESULT OF AN INTERNAL FAILURE Perform the following:			
		a. Perform steps *a* and *b* under MAIN GEAR BOX REPLACEMENT.		
		b. Replace main gear box oil cooler, including regulator, valves, etc, with like serviceable items.		
3	AFTER FIRST FLIGHT FOLLOWING INSTALLATION OF MAIN GEAR BOX SUPPORTS			
		Main gear box support bolt nuts for specified torque (upper, 4500 to 5000 inch-pounds; lower, 3000 to 3200 inch-pounds).		
6	EVERY TAIL GEAR BOX CHANGE			
		Pylon tail rotor gear box fitting assembly (part No. S1620-64129) for cracks (dye penetrant).		
3, 4, 5, 6, 7, and 9	AFTER EVERY HARD LANDING Inspect the following:			
		a. Tail cone and pylon for cracks, buckles, wrinkling and loose or missing rivets; particularly at station 316 and adjacent areas.		
		b. Landing gear assemblies and areas of attachment inspected for cracks and distortion.		
12	WHENEVER CLUTCH IS REPLACED			
		a. Engine shaft nut, ring, plate assembly, clutch, hub, disc assembly, and lockpin assembly for cracks (magnetic particle).		
		b. Bronze centering cones for galling or evidence of hub rocking on cones.		
		c. Clutch hub splines and engine shaft splines for cracks, corrosion, or galling.		
1 and 13	WHEN OPERATING HELICOPTER IN AREAS WHERE GROUND TEMPERATURE IS CONSISTENTLY BELOW 0°F			
		Perform complete oil dilution operational check during every periodic inspection.		
All Areas	AT ANY TIME THAT EQUIPMENT REPLACEMENT, MODIFICATION, OR RELOCATION MIGHT CAUSE COMPASS DEVIATION			
		Magnetic compass indicator for correct reading on all cardinal headings. Recompensate if necessary.		
13	WHEN THE RELIEF TUBE HAS BEEN USED			
		Clean the relief tube horn and venturi with a disinfectant-deodorant solution.		

AIRCRAFT INSPECTION CHECKSHEET	TYPE OF INSP (Daily, Intermediate, etc.) SPECIAL	PAGE NO. 11	NO. OF PAGES 11
AIRCRAFT AND SERIAL NO.	INSPECTION NO.	DATE OF INSPECTION	

AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
All Areas	AFTER INSTALLATION, REMOVAL, OR RELOCATION OF EQUIPMENT AND OR MAJOR MODIFICATION WHICH RESULTS IN AN UNKNOWN CHANGE IN THE BASIC WEIGHT AND BALANCE: AFTER REPORT OF UNSATISFACTORY FLIGHT CHARACTERISTICS			
		Weigh helicopter and accomplish necessary entries in the Handbook of Weight and Balance Data.		
All Areas	EVERY 180 DAYS Perform the following:			
		Weigh CF_3Br fire extinguisher. Replace if weight loss, less valve, is 4 ounces or more under weight stenciled on container.		
All Areas	EVERY 12 MONTHS Inspect the following:			
		a. Magnetic standby compass for discoloration of liquid and proper calibration; recompensate if necessary (TM 55-405-3).		
		b. Disconnect pitot-static system lines at instruments and clean lines with dry, high air pressure to remove foreign material and moisture. System leak tested, utilizing instrument test set. Air speed indicator checked for correct calibration of major graduations within speed range of helicopter.		
		c. Replace cotton seat belts and shoulder harness. (TM 55-405-3.)		
		d. Accomplish weight and balance in accordance with AR 95-16.		
		e. Turn in first aid kits for inspection in accordance with TB AVN 10.		
All Areas	EVERY 5 YEARS			
		Replace nylon seat belts and shoulder harness. (TM 55-405-3.)		
All Areas	UPON TRANSFER AND UPON RECEIPT OF A HELICOPTER UPON EXPIRATION OF TWELVE MONTHS ELAPSED TIME SINCE LAST INVENTORY. UPON PLACING HELICOPTER IN STORAGE AND UPON REMOVING FROM STORAGE: (Helicopter need not be inventoried while in storage).			
		Inventory helicopter for availability of inventoriable property. (Reference DA Form 2408-17 and Appendix III.)		

Section III Test Flight

3–5. Definition and General Information. This section contains test flight inspection requirements peculiar to the CH-34 helicopter. Conditions requiring accomplishment of test flight shall be in accordance with TB AVN 23-16 and changes thereto. The requirements herein are established to assure a thorough inspection of the helicopter before flight, during flight, and upon completion of the test flight. When a test flight is performed for the purposes of determining if specific equipment or systems are in proper operating condition, requirements not related to such equipment or systems should be disregarded.

3–6. The test flight inspection checksheets are presented in a format for local reproduction. Continuation sheets shall be used when necessary for each part. Explanation of the checksheets is as follows:

Block 1	Helicopter Model and Series
Block 2	Complete Helicopter Serial Number
Block 3	Organizational Unit Performing Test Flight
Block 4	Day, Month, and Year
Block 5	Reason Test Flight is Being Performed
Block 6	Numerical Inspection Item Identification Number
Block 7	Inspection Requirements Arranged in Chronological Order
Block 8	Instrument Minimum and Maximum Operating Ranges
Block 9	Actual Indication Entered at Time of Test Flight
Block 10	Enter satisfactory or unsatisfactory symbol (as shown in note) at time of test flight. All unsatisfactory symbols will be explained in remarks. (Test Flight Checksheet, Part IV).

3–7. Additional information, relative to recording of inspection on applicable forms and the use of this manual, may be obtained by consulting applicable technical directives that are listed in Appendix I.

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK				PAGE NO. 1	NO. OF PAGES 12
1. TYPE ACFT	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	

NOTE: Symbol for Block 10 – (✓) Satisfactory (X) Unsatisfactory (Explain in Remarks)

6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	8. RANGE MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
1	Helicopter forms inspected.				
2	Daily inspection completed.				
3	Flight readiness check completed.				
4	Turn engine through hydraulic lock.				
5	Instrument check				
	a. Static pressure reading.				
	b. Range markings.				
	c. Adjust altimeter.				
	d. Verify barometric pressure with control tower.				
	e. Fuel quantity indicator against known quantity in the cells.				
6	Push test warning lights for operation.				
7	Pre-engine start check completed.				
8	Engine start and warmup				
	a. Start (rpm)		1400		
	b. Idle (rpm)	900	1100		
	c. Warmup (rpm)		1400		
9	Oil pressure check: (No indication in 10 seconds, shut down engine. If pressure has not reached 40 psi in 20 seconds, shut down engine.) (psi)	55	90		
10	Check oil temperature.	30°C	104°C		
11	Check fuel pressure. (psi)	19	28		
12	Check cylinder head temperature.	100°C	260°C		
13	Check fuel boost pumps (ON – OFF).				
14	Bleed manifold pressure lines.				
15	Perform idle mixture check (rich or lean by rpm).				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)				PAGE NO. 2	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
16	Check carburetor air temperature.	-10°C	+40°C		
17	Check carburetor air temperature control.				
18	Check engine operation by each fuel tank selection.				
19	Check automatic stabilization equipment:				
	Caution The following checks should be accomplished during maintenance functional test flights by test flight personnel only.				
	a. Automatic stabilization equipment override check (pitch, roll, and yaw).				
	The following check for proper linkage adjustments between controls and servo pilot valves must be made with engine operating at 1600 rpm, clutch disengaged, and external power connected. This check is to be performed prior to flying helicopter, after maintenance work has been performed on flight servo system linkage or on the automatic stabilization motors. It may also be performed whenever a check of the automatic stabilization equipment is desired.				
	During override check, keep hand on collective pitch lever and apply friction to restrain any tendency of collective pitch lever to rise. If collective pitch lever is allowed to rise, engine overspeed may result.				
	(1) Throttle – 1600 ENGINE RPM.				
	(2) ASE circuit breakers – SET.				
	(3) Cyclic stick – CENTERED.				
	(4) Tail rotor pedals – CENTERED: FEET ON PEDALS.				
	(5) Collective pitch lever – MINIMUM.				
	(6) Altitude channel disengage switch – OFF.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)				PAGE NO. 3	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
	Note Four channels are not tested at same time to avoid possibility of damage to helicopter. (7) ASE engage button – DEPRESS. Engage button should not be depressed sooner than 2-1/2 minutes after generator power has cut in or external power is plugged in; green light in button should come on. If light does not come on, wait an additional 1/2 minute and depress engage button again. (8) ASE standby button – DEPRESS. Green light will go out. **Note** It is necessary to first engage equipment and then place it in standby to connect ac operating power to equipment. (9) Pitch, roll, and yaw channel disengage switches – ON. (10) Override check switch – LEFT, FWD, DOWN, INCR. **Note** When override check switch is actuated, automatic stabilization system introduces a steady full-authority signal in one direction to pitch, roll, and yaw servo motors simultaneously. Prepare to resist a pedal force of 40 pounds. Null indicator on the automatic stabilization control panel should swing full left. (11) Channel selector switch – ROTATE THROUGH THE PITCH, ROLL, AND YAW POSITIONS. Check that servo motors are at their extreme positions. Null indicator should indicate full left for these channels.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)				PAGE NO. 4	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
	Note No forces should be fed back through pitch or roll channels. If any resistance or seizing is felt, control linkage is improperly adjusted. (12) Tail rotor pedals – MOVE TO EXTREMES OF TRAVEL IN BOTH DIRECTIONS. A force of 40 pounds will be required on right pedal in addition to normal pedal damper restraint. (13) Cyclic stick – DEPRESS TRIM RELEASE BUTTON AND MOVE STICK RAPIDLY TO EXTREMES. **Note** Maximum rate of control movement for the cyclic stick right and aft (against automatic stabilization signals) will be slower than in opposite directions, but should not be less than a rate corresponding to full stick travel in approximately 1 second. Any resistance or seizing of controls or excessive pedal force indicates improper adjustment of control linkage. (14) Override check switch – RIGHT, AFT, UP, DECR. (15) Channel selector switch – ROTATE THROUGH THE PITCH, ROLL, and YAW POSITIONS. Check that servo motors are at their extreme positions. Null indicator should indicate full right for these channels. **Note** No forces should be fed back through pitch or roll channels. If any resistance or seizing is felt, control linkage is improperly adjusted.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)					PAGE NO. 5	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)	
	(16) Tail rotor pedals – MOVE TO EXTREMES OF TRAVEL IN BOTH DIRECTIONS. A force of 40 pounds will be required on left pedal in addition to normal pedal damper restraint. (17) Cyclic stick – DEPRESS TRIM RELEASE BUTTON AND MOVE STICK RAPIDLY TO EXTREMES. **Note** When override check switch is actuated to right position, same conditions noted during left position check should be experienced except that slower rates of cyclic stick travel will be in left and forward directions. Forty-pound holding force will be on left tail rotor pedal. Null indicator should swing full right for all channels. (18) Override check switch – OFF. (19) Channel selector switch – PITCH. ***Caution*** Do not operate override check switch in flight since this introduces simultaneous hard-over signals on all four channels whether or not automatic stabilization equipment is engaged. Results of using this switch in flight are quite severe and should not be demonstrated. *b.* Automatic stabilization equipment override check (altitude).					

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)					PAGE NO. 6	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)	
	Caution When performing this check, keep finger on servo switch and prepare to place in AUX OFF position, in an emergency, to avoid possible engine overspeed. (1) Throttle – 2000 ENGINE RPM. (2) ASE standby button – DEPRESS. (3) Pitch, roll, and yaw channel disengage switches – OFF. (4) Altitude channel disengage switch – ON. (5) Override check switch – LEFT, FWD, DOWN, INCR. (6) Channel selector switch – ALT. Null indicator needle should indicate full left. (7) Collective pitch lever – RAISE UP 4 INCHES AND THEN LOWER RAPIDLY. Back off throttle when increasing pitch to prevent engine overspeed. **Note** Maximum rates of control movement for collective pitch lever up (against automatic stabilization signals) will be slower than in opposite directions, but should not be less than a rate corresponding to full control travel in approximately 1 second. No forces should be fed back through altitude channel. If any resistance or seizing is felt, control linkage is improperly adjusted. (8) Override check switch – RIGHT, AFT, UP, DECR. (9) Channel selector switch – ALT. Null indicator needle should indicate full right. (10) Collective pitch lever – RAISE UP 4 INCHES AND THEN LOWER RAPIDLY. Back off throttle when increasing pitch to prevent engine overspeed.					

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)				PAGE NO. 7	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
	Note Maximum rates of control movement for collective pitch lever down (against automatic stabilization signals) will be slower than in opposite directions, but should not be less than a rate corresponding to full control travel in approximately 1 second. No forces should be fed back through altitude channel. If any resistance or seizing is felt, control linkage is improperly adjusted. (11) Altitude channel disengage switch – OFF. (12) Override check switch – OFF. (13) Channel selector switch – PITCH. c. Automatic stabilization equipment checks (pitch, roll, and yaw) night or instrument flights. Under normal conditions, it is necessary only to set cg trim, slave the gyro-magnetic compass, and engage automatic stabilization equipment. For night or instrument flight, the following checks may be performed on ground before takeoff or while taxiing. **Note** If these checks are being performed when not taxiing, tail wheel should be unlocked and all tiedowns removed. (1) Pitch, roll, and yaw channel disengage switches – ON. (2) Channel selector switch – ROLL. Check roll channel with the rotary channel selector switch in the ROLL position by moving cyclic stick laterally and noting that needle of null indicator follows movement of stick. (3) Channel selector switch – PITCH. Check pitch channel with channel selector in PITCH position by moving cyclic stick fore and aft and noting that cg null indicator needle follows movement of stick.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)				PAGE NO. 8	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
	(4) Channel selector switch – YAW. Check yaw channel by either of following methods: While taxiing, remove feet from tail rotor pedals and slowly turn yaw trim knob in either direction. Slight changes should be noted in heading of helicopter. Adjust yaw trim knob to guide helicopter in desired direction with feet removed from tail rotor pedals. When not taxiing, unlock tail wheel, remove feet from tail rotor pedals, and turn yaw trim knob in either direction. Tail rotor pedals should jump slightly, and tail of helicopter will shift an amount corresponding to amount of yaw trim applied.				
	Caution Before accomplishing this check, be sure there is adequate clearance for shift in fuselage direction.				
	Note Ability of automatic stabilization equipment to hold a heading while taxiing or to turn when performing directional control checks will depend on rotor rpm, wind velocity, runway surface, and like conditions. A tendency to overshoot, expecially after commanding a sizeable heading change with yaw trim knob, does not necessarily indicate automatic stabilization system malfunction and may be easily suppressed by pilot's assistance on tail rotor pedals.				
	(5) Channel selector switch – PITCH.				
20	Rotor brake off.				
21	Check clutch engagement and disengagement (light for operation).				
22	Engage rotor.				
23	Check transmission oil pressure and warning light. (psi)	25	120		

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I – GROUND CHECK (CONTINUED)					PAGE NO. 9	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS		8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
24	Check generator output.	(Volts)	27.2	28.8		
25	Check load-meter for operation.					
26	Check transmission oil temperature.					
	a. Inlet		−15°C	120°C		
	b. Outlet		−15°C	140°C		
27	Perform ignition switch check (grounding).					
28	Perform ignition system check at 2200 rpm 25 in. Hg. (rpm drop)	L MAG		−75		
		R MAG		−75		
29	Servo check.	(psi)	1300	1600		
30	Check free-wheeling unit.					
31	Flight instrument check (gyro).					
32	Check communication equipment.					
33	Taxi, check brakes.					

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART II – IN FLIGHT CHECK				PAGE NO. 10	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
1	Check engine instruments. (Note: Desired operating ranges)				
2	Transmission oil pressure within limits. (psi)	40	90		
3	Takeoff to hover.				
	a. Check cyclic stick response.				
	b. Check collective stick response.				
	c. Tail rotor response.				
4	Hovering turns: 360-degree turns to right and left (not to exceed limitations set forth in TM 55-1520-202-10).				
5	Hovering flight: Check forward, rearward, and sideward flight. With ASE engaged. Without ASE.				
6	Check flight instruments for operation.				
7	Throttle correlation.				
8	Forward flight (vibration)				
	a. Lateral.				
	b. Vertical.				
	c. Hi-frequency.				
9	Perform autorotation in accordance with TM 55-1520-202-10.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART III AFTER TEST FLIGHT				PAGE NO. 11	NO. OF PAGES 12
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE MIN	MAX	9. ACTUAL INDICATION	10. LEGEND (See note)
1	Engine after flight operational checks accomplished in accordance with TM 55-1520-202-10.				
2	Engine shut down in accordance with TM 55-1520-202-10.				
3	Servo units checked for fluid leakage.				
4	Main rotor dampers for fluid leakage.				
5	Hydromechanical clutch for fluid leakage.				
6	Helicopter for fuel leakage.				
7	Engine for fuel or oil leakage.				
8	Helicopter secured in accordance with paragraph 1-51.				
9	Record discrepancies noted on DA Form 2408-13.				

6. ITEM NO.	AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART IV – REMARKS	PAGE NO. 12	NO. OF PAGES 12

TYPED OR PRINTED NAME OF PILOT	SIGNATURE
TYPED OR PRINTED NAME OF OBSERVER	SIGNATURE

Section IV Overhaul and Retirement Schedule

3—8. Scope. This section lists units of operating equipment that are to be overhauled or retired at the period specified. Removal of equipment for overhaul may be accomplished at the inspection nearest the time when overhaul is due unless otherwise specified in TB AVN 23-10. Upon replacement of items listed in this section, all applicable forms, records, and worksheets will be completed and updated as required (TM 38-750).

3—9. Overhaul Interval. The maximum authorized operating time of parts prior to removal for overhaul at maintenance level authorized in accordance with the Maintenance Allocation Chart.

3—10. Retirement Schedule. The operating time specified for removal, condemnation, and disposal of parts in accordance with applicable directives.

AREA	OVERHAUL INTERVAL	RETIREMENT INTERVAL	ITEM AND PART NO.
1	900 hours		Engine, R1820-84A
	1000 hours		Engine, R1820-84C
			Main transmission:
3	350 hours		*a.* S1635-20000-1, -2, -3, -4, -6, -7, -8, and -9.
3	800 hours		*b.* S1635-20000-10.
3	1100 hours		*c.* S1635-20000-5, -12, -14, -16, -18, -19, and -24.
3	500 hours		Main rotor blades, S1615-20000 and -1.
			Main rotor head assembly, including hub assembly.
3	350 hours		*a.* S1610-20000-1, -2, -3, -6, and -10.
3	600 hours		*b.* S1610-20000-8 and 14.
3	1100 hours		*c.* S1610-20000-16 and 16X.
3		250 hours*	Bracket assembly, main rotor damper, S1610-23035.
3		3300 hours*	Link assembly, upper, S1610-24055, -1, -2, -3, -4.
3	1100 hours		Damper assembly, main rotor, S1610-26000-1, -2, -3, -4.
3	1100 hours		Star assembly, azimuth control, S1610-24000-1, -4, -6.
3	1100 hours		Scissors assembly, rotating star, S1610-24050, -3, -4.
3	1100 hours		Scissors assembly, stationary star, S1610-24035-2.
			Intermediate gear box:
5	1300 hours		*a.* S1635-64100-1, and -2.
5	1300 hours		*b.* S1635-64100-3.
6		500 hours*	Tail rotor blades, S1615-30100-8 and -8X.
			Tail rotor gear box:

*Condemn, salvage locally.

AREA	OVERHAUL INTERVAL	RETIREMENT INTERVAL	ITEM AND PART NO.
6	700 hours		*a.* S1635-64000-1, and -2.
6	1300 hours		*b.* S1635-64000-3.
12	700 hours		Hydromechanical clutch, S1635-91000-15, -16, -18, -20, -22, -24, -26, and S1635-91101-1.
12	800 hours		Hydromechanical clutch, S1635-91101-8.
3		2500 hours*	Main rotor blades, S1615-20100 and -1.
			Tail rotor assembly:
6	250 hours		*a.* S1610-31100-21 (Containing hub S1610-33003-1)
6	1200 hours		*b.* S1610-31100-20 (Containing hub S1610-33003-2)
			Tail rotor hub assembly:
6		250 hours*	*a.* S1610-33003 and -1
6		2500 hours*	*b.* S1610-33003-2

*Condemn, salvage locally.

Section V Standard of Serviceability

3—11. Purpose. This section provides a guide to all personnel engaged in the maintenance of Department of the Army helicopters in determining serviceability of helicopters.

3—12. Maintenance Functions and Inspections. The availability of serviceable helicopters is contingent upon effective maintenance management; therefore, the maximum utilization of available capabilities, faithful and timely performance of assigned maintenance functions, and conscientious performance of specified maintenance inspections augmented by careful supervision and strict quality control will enhance helicopter availability and serviceability.

3—13. Standards of Serviceability. Serviceability can be determined only by actual inspection of the helicopter and can be determined at any time throughout the life cycle of the helicopter. Wear tolerance and maximum allowable deterioration, specified in maintenance and inspection requirements, have been designed to assure a high degree of serviceability, availability, and safety. These tolerances and limits are the basic standards for serviceability and are embodied in helicopter maintenance and inspection manuals; therefore, inspection for serviceability is performed during every maintenance inspection.

3—14. Degree of Serviceability. Transfer of helicopters generates administrative and technical problems for supply and maintenance management. To minimize the impact upon the receiving activity of a transferred helicopter, degrees of serviceability are established to supplement basic standards included in present maintenance and inspection requirements. The supplementary standards, contained in this section, have been designed to assure that sufficient reliable hours of flight are remaining on the helicopter and components to satisfy immediate operational and logistical requirements of the receiving activity when the helicopter is being transferred within CONUS, overseas, or into combat operations. The degree of serviceability required for helicopters upon completion of overhaul will be to the same degree required for transfer within CONUS, except when helicopter is predetermined to be destined for overseas or into combat, in which case the overhauled helicopter will conform to the standard for the specific transfer condition.

STANDARDS OF SERVICEABILITY

ITEM NO.	ITEM	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER WITHIN CONUS	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER FROM CONUS TO OVERSEAS	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER FROM CONUS TO COMBAT OPERATIONS
	GENERAL			
1.	INSPECTION	Perform next intermediate inspection; when next periodic inspection is due within 25 operating hours, perform next periodic inspection.	Perform next periodic inspection.	Perform next periodic inspection.
2.	MODIFICATION	Accomplish all MWO or TCTM organizational and direct support modifications.	Accomplish all MWO or TCTM organizational, direct support, general support, and depot maintenance modifications which have an issue date of 3 months prior to date of transfer. Accomplish all depot maintenance controlled modifications which are authorized by AVCOM, but not printed as MWO's or TCTM's.	Accomplish all MWO or TCTM organizational, direct support, and general support maintenance modifications, which have an issue date of 1 month prior to date of transfer.
3.	MISSION ESSENTIAL EQUIPMENT	Assure mission essential equipment is installed.	Assure mission essential equipment is installed and is completely operational.	Assure mission essential equipment is installed and is completely operational.
	AIRFRAME			
4.	HELICOPTER PAINT CONDITION	Touch up by area, spraying as necessary to provide a protective seal on all required surfaces.	Touch up by area, spraying as necessary to provide a protective seal on all required surfaces; completely repaint if condition of existing paint warrants. Paint necessary peculiar markings on helicopter required by the theater of operations.	Touch up by area, spraying as necessary to provide a protective seal on all required surfaces. Paint necessary peculiar markings on helicopter required by theater of operations.
5.	COMPONENT REPLACEMENT			
	a. Items having a scheduled replacement or retirement time below 500 hours.	Replace if less than 50 hours of scheduled operating time remains.	Replace if less than 100 hours of scheduled operating time remains.	Replace if less than 200 hours of scheduled operating time remains.
	b. Items having a scheduled replacement or retirement time over 500 hours.	Replace if less than 10 percent of scheduled operating time remains.	Replace if less than 25 percent of scheduled operating time remains.	Replace if less than 50 percent of scheduled operating time remains.
6.	CONTROL CABLES			
	a. 7 x 7	Replace when more than three strands are broken or corroded within a 1-inch distance.	Replace when more than three strands are broken or corroded within a 1-foot distance.	Replace when more than three strands are broken or corroded within a 2-foot distance.
	b. 7 x 19	Replace when more than six strands are broken or corroded within a 1-inch distance.	Replace when more than six strands are broken or corroded within a 1-foot distance.	Replace when more than six strands are broken or corroded within a 2-foot distance.

STANDARDS OF SERVICEABILITY (CONT)

ITEM NO.	ITEM	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER WITHIN CONUS	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER FROM CONUS TO OVERSEAS	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER FROM CONUS TO COMBAT OPERATIONS
7.	STANDBY OR MAGNETIC COMPASS	Swing compass and recompensate at interval specified in inspection requirements.	Swing compass and recompensate.	Swing compass and recompensate.
8.	TIRES	Replace if less than 25 percent of tread remains.	Replace if less than 50 percent of tread remains.	Replace if less than 75 percent of tread remains.
9.	COMMUNICATION EQUIPMENT	Assure equipment is completely operational.	Assure type of equipment installed is compatible to type and system utilized at destination and equipment is fully operational.	Assure type of equipment installed is compatible to type and system utilized at destination and equipment is fully operational.
10.	ELECTRONIC NAVIGATION EQUIPMENT	Assure equipment is completely operational.	Assure type of equipment installed is compatible to type and system utilized at destination and equipment is fully operational.	Assure type of equipment installed is compatible to type and system utilized at destination and equipment is fully operational.

CHAPTER 4

AIRFRAME AND ALIGHTING GEAR

Section I Scope

4–1. Purpose. The purpose of this chapter is to provide all the essential information needed for maintenance personnel to accomplish organizational maintenance on the complete airframe and alighting gear as prescribed by the Maintenance Allocation Chart.

4–2. Description. This chapter consists of the fuselage section, empennage section, pylon section, and alighting gear. Each section of the fuselage is detachable from the adjoining section. The alighting gear consists of a conventional, nonretractable-type main landing gear and a single tail wheel landing gear which can be locked in the trailing position.

4–3. Maintenance of Airframe Surfaces. The maintenance of fuselage surfaces, other than acrylic plastic, requires a comprehensive program of preventive maintenance that is adapted to the specific operating conditions of the helicopter. Periodic washing and cleaning, inspection, recognition and treatment of corrosion, and touchup of surfaces which have lost their protective coatings will prevent extensive structural repairs and add to fuselage life. Diligent preventive maintenance keeps corrosion at a minimum. A thorough periodic inspection for corrosion is necessary to uncover any condition of corrosion before it becomes extensive. The following paragraphs give, in detail, the recommended procedures for fuselage surface maintenance. The applicable procedures should be incorporated into the maintenance program of operating units as dictated by experience gained under specific operating conditions.

4–4. Causes and Detection of Corrosion. Corrosion of the airframe is normally caused by scratches or worn patches on the protective finish, foreign matter embedded in unprotected crevices and surfaces, moisture permeating painted and treated surfaces, salt in sea air or spray, engine exhaust gases, battery acid, and relief tube spray. Corrosion produces a scaly, blistered appearance. Affected areas are dull and pitted and have deposits of gray or white powder with blistering or cracking of the finish lacquer coating and discoloration of the zinc chromate primer coating. Periodic examinations for corrosion should be made, and if corrosion is found, treat in accordance with paragraphs *a* through *e* below.

a. General precautions to prevent corrosion.

(1) Clean and inspect airframe surfaces periodically.

(2) Keep all drain holes open.

(3) Remove all metal particles and foreign matter after repair in any airframe area.

b. External surface corrosion inspection. (1) Inspect protective finish for blistering, cracks, fading, peeling, punctures, scratches, tears, or other damage, particularly around bolts, screws, or other fasteners.

(2) Inspect seams and joints for loose or missing sealing compound.

(3) Inspect exposed skin edges for condition of corrosion-protective finish, the sealing compound, and for evidence of corrosion.

(4) Inspect dissimilar metal contacts for evidence of corrosion. (See figure 4–1 or 4–2.)

(5) Inspect areas that are exposed to exhaust gases or relief tube spray for evidence of corrosion.

c. Internal surface corrosion inspection. (1) Inspect primed surfaces for scratches and other damage or wear.

(2) Inspect magnesium alloy surfaces for condition of primer coating.

(3) Inspect areas of dissimilar metal contacts for evidence of corrosion. (See figure 4–1 or 4–2.)

(4) Inspect area around bolts, screws, and other fasteners for corrosion and for condition of primer coating.

(5) Inspect hidden surfaces when removal of any equipment exposes area.

(6) Inspect area around battery for condition of acid-resistant lacquer.

d. Surface corrosion touchup treatment. (1) Wash corroded surface in accordance with paragraph 1–62.

Caution

Do not use steel wool, emery cloth, or a wire brush on magnesium surfaces. Use a phenolic scraper, fiber brush, aluminum wool, or rotary file to remove loose flakes or corrosion.

(2) Apply chemical film (item 30, table 1–8) to corroded surfaces liberally with a mop.

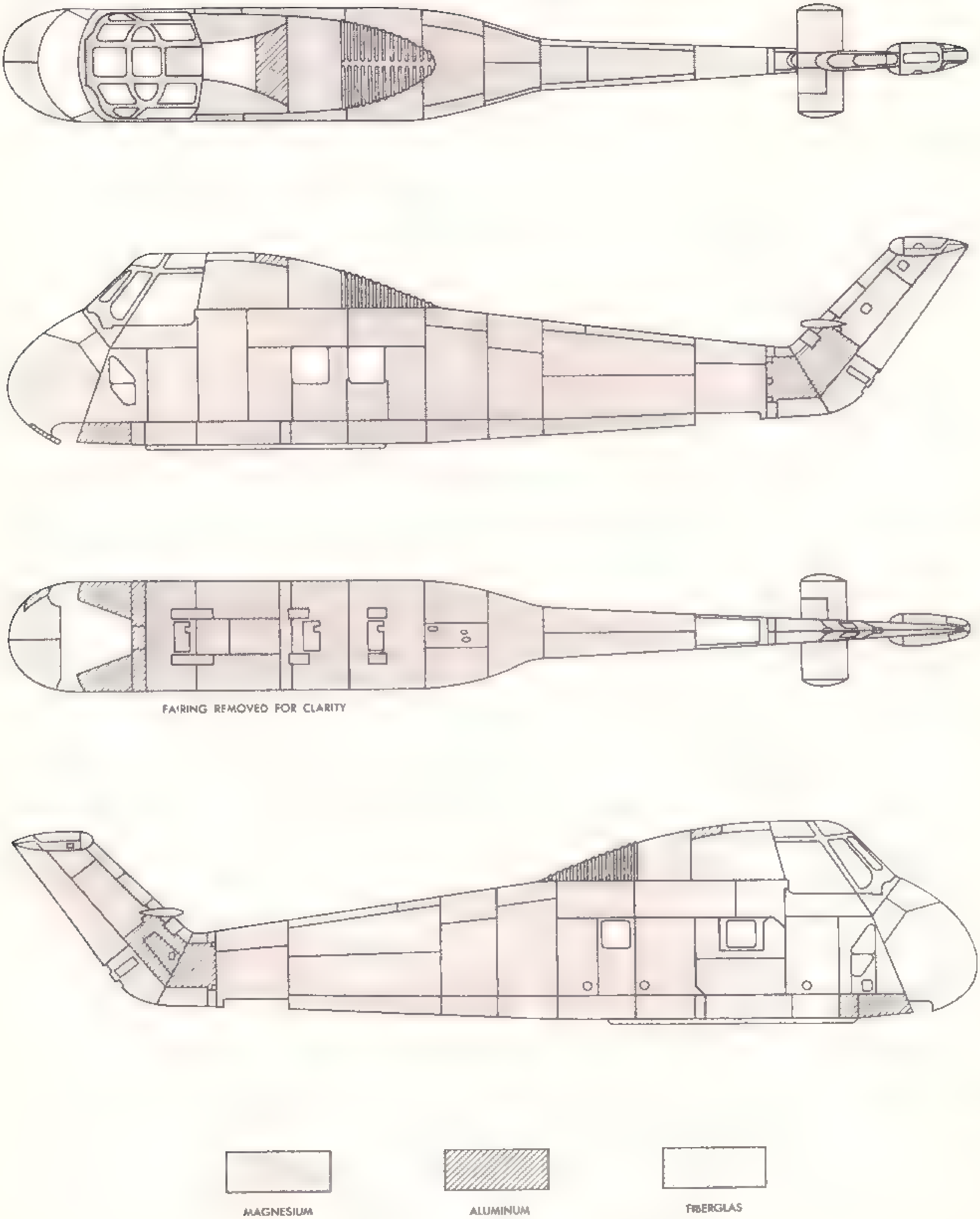


Figure 4–1. Skin plating (helicopters serial No. prior to 56-4284)

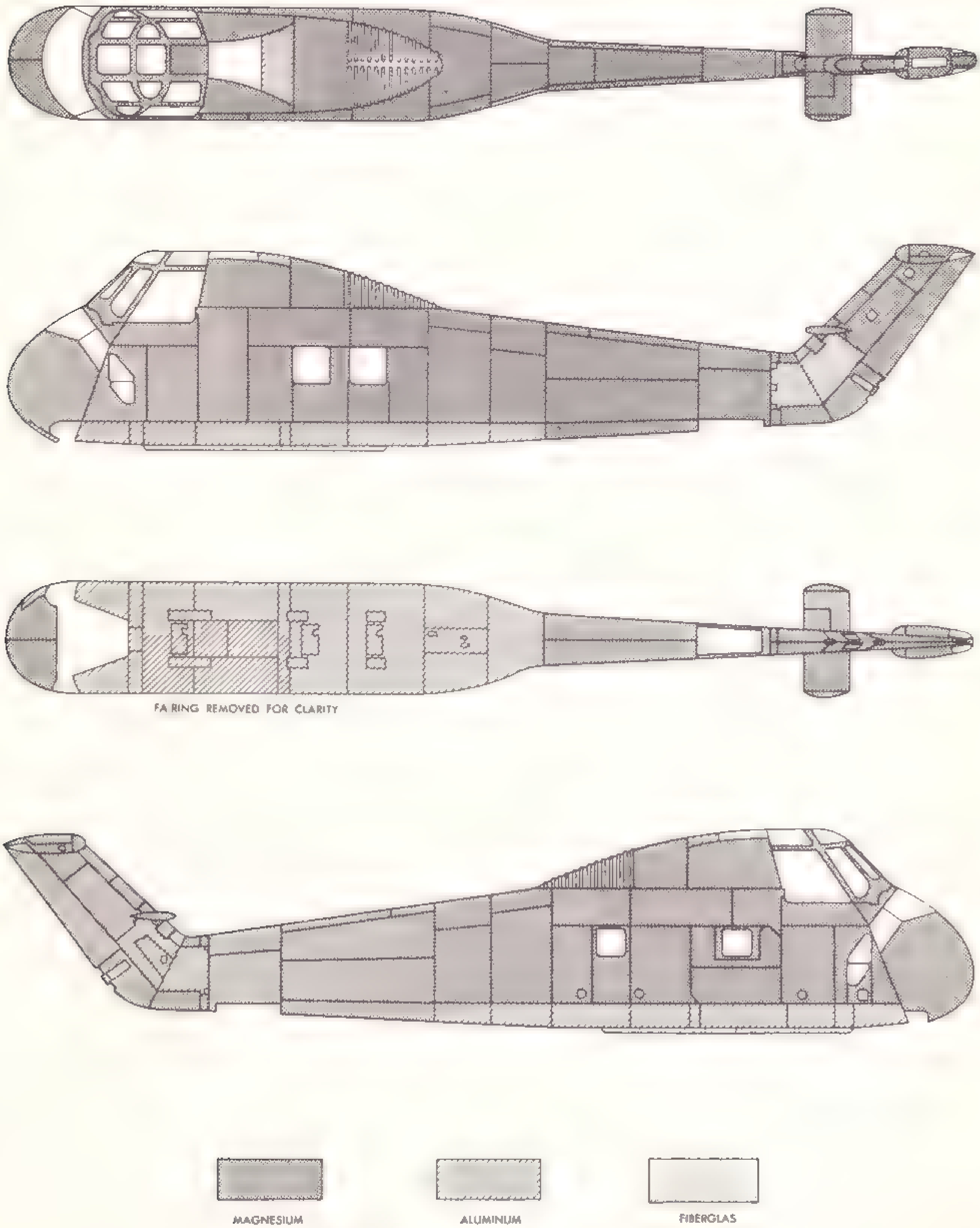


Figure 4—2. Skin plating (helicopters serial No. 56-4284 and subsequent)

(3) Allow chemical film to remain on corroded surface for approximately 5 minutes.

Note

Do not allow chemical film to dry on corroded surface. If chemical film dries, rewet corroded surface.

(4) Rinse corroded surface with water and dry with a cloth. Remove any moisture from joints and seams with dry, compressed air.

(5) When corroded surface is completely dry, apply two coats of primer coating (item 19, table 1–8). Allow primer coating to dry approximately 30 minutes between coats.

(6) Paint affected areas in accordance with TB AVN 7.

e. Limited anticorrosion measures. Use the limited anticorrosion measures outlined in steps (1) through (5) below only in cases where proper materials or equipment are not available.

(1) Examine area in question for extent of corrosion.

Warning

If area is corroded too far to withstand normal loads before helicopter can reach a major overhaul base, structural repair will have to be performed on area before helicopter is cleared for flight.

(2) Remove any loose and powdery products of corrosion by scraping or brushing area.

Caution

Do not use steel wool, emery cloth, wire brush, or sharp metal tool. Use sharp phenolic scraper or heavy fiber brush to clean affected areas.

(3) Wash off areas with a mild soap and clean, fresh water. Rinse thoroughly.

(4) Dry surface and paint it with two coats of primer coating (item 19, table 1–8).

(5) If primer coating is not available, apply corrosion preventive compound (item 27, table 1–8) and grease (item 21, table 1–8) to corroded surface.

4–5. *Insulation of Dissimilar Metals Against Electrolytic Corrosion.* Dissimilar metal contacts should be avoided when possible. To prevent corrosion between dissimilar metals, follow the procedures outlined in paragraphs *a* through *f* below.

a. General insulation requirements (all metals). A minimum of four coats of primer coating (item 19, table 1–8) plus the standard chemical finishes and coatings (cadmium or zinc plating on steel; anodic or chemical film on aluminum; dichromate treatment for magnesium, etc) should be used to insulate contacting surfaces of dissimilar metals.

b. Bolts contacting magnesium. Use 5052 or 5056 aluminum alloy washers under bolt heads and nuts (where torque and strength requirements permit) which would otherwise contact magnesium. The installation of bolts frequently breaks through a normal primer coating, so a fillet of unthinned or slightly thinned primer coating must be applied between the dissimilar metals during assembly. If the application of primer coating during assembly is determined impractical, the joint must be thoroughly sealed with primer coating after assembly. For the preparation and use of primer coating for insulation, refer to paragraph 4–9.

Note

In applications where steel washers are necessary, the washers must be dipped in primer coating (item 19, table 1–8) prior to installation.

c. Bolts, rivets, etc, passing through dissimilar metals. Fixed rivets, studs, bolts, etc, used in, or passing through dissimilar metals, should be coated with primer coating (item 19, table 1–8) and installed while the primer coating is wet, where possible. The primer coating should be wiped so as to form a fillet seal between the parts.

Caution

Care should be taken that the excess primer coating does not interfere with the function of any part.

d. Shoulder bushings, straight bushings, and bearings passing through magnesium. In addition to the requirements given in paragraph *c* above, shoulder bushings pressed into magnesium shall be insulated from the magnesium by means of an adhesive-backed vinyl-plastic tape washer under the head of the shoulder bushing. Where possible, the washer shall extend at least 1/4 inch beyond the edge of the shoulder. The washer shall be applied prior to assembly as described in paragraph 4–6. Straight bushings and bearings pressed into magnesium shall be insulated by means of a primer coating (item 19, table 1–8). The primer coating should be applied freely over the external contacting edges of the bushing or bearings so as to completely seal the area.

e. Magnesium contacting magnesium. Contacting surfaces of magnesium to magnesium joints must be insulated with type III sealing compound (item 31, table 1–8) as follows:

(1) Apply a thin coat of sealing compound to each mating surface of the magnesium.

(2) Before riveting or fastening, allow as much sealing compound as possible to squeeze out.

(3) After completion of assembly, fillet squeezed out sealing compound into seam and remove any excess sealing compound. Use a soft, lint-free cloth moistened

with alcohol (item 32, table 1–8) to remove excess sealing compound.

Note

Type III sealing compound is nonhardening and the assembly may be made any time after application.

f. Magnesium contacting other metals. In areas where magnesium is being joined to another metal, one of the following insulation procedures must be followed:

(1) Apply tape (item 35, table 1–8) as described in paragraph 4–6.

(2) Apply sealing compound (item 34, table 1–8), when tape is impracticable, in accordance with paragraph 4–7.

(3) Apply aluminum foil (item 33, table 1–8) as described in paragraph 4–8 when excessive service temperatures are to be encountered.

(4) Apply sealing compound (item 34, table 1–8) to caulk areas which would otherwise retain water.

(5) Apply primer coating (item 19, table 1–8) as described in paragraph 4–9 if all of insulation procedures listed in steps (1) through (4) are difficult to perform.

4–6. Use of Vinyl-Plastic Tape. Where practicable, insulation of dissimilar metal joints in which magnesium alloy is one of the contacting materials should be accomplished by the use of tape (item 35, table 1–8). Tape may be omitted only where its use would cause malfunctioning of the parts, where its thickness would preclude assembly, or where service temperatures exceed 148.9°C (300°F). The tape should extend approximately 1/2 inch, and in no case less than 1/4 inch, beyond joint edges, except on fillet-sealed or exterior laps where it should be flush with the joint. It should be applied prior to assembly and pressed firmly in place. The tape must present a smooth surface and be substantially free from air bubbles or wrinkles. To avoid creepback, the tape must not be stretched during application. Where practicable, the tape should be applied with the adhesive to the magnesium alloy surface and away from the direction of drilling. Heavier tape (item 36, table 1–8) (type I) should be used on applications such as screen installations where maximum protection against chafing is required. (See figure 4–3.)

Caution

Do not use portions of the helicopter to back tape for cutting purposes. Avoid scratching or marking structural materials.

4–7. Use of Sealing Compound. Where the use of vinyl-plastic tape for insulating purposes is impracticable, an approved curing-type sealing compound (item 34, table 1–8) must be used in place of the tape. The sealing compound should be applied between contacting surfaces of magnesium and the dissimilar metal,

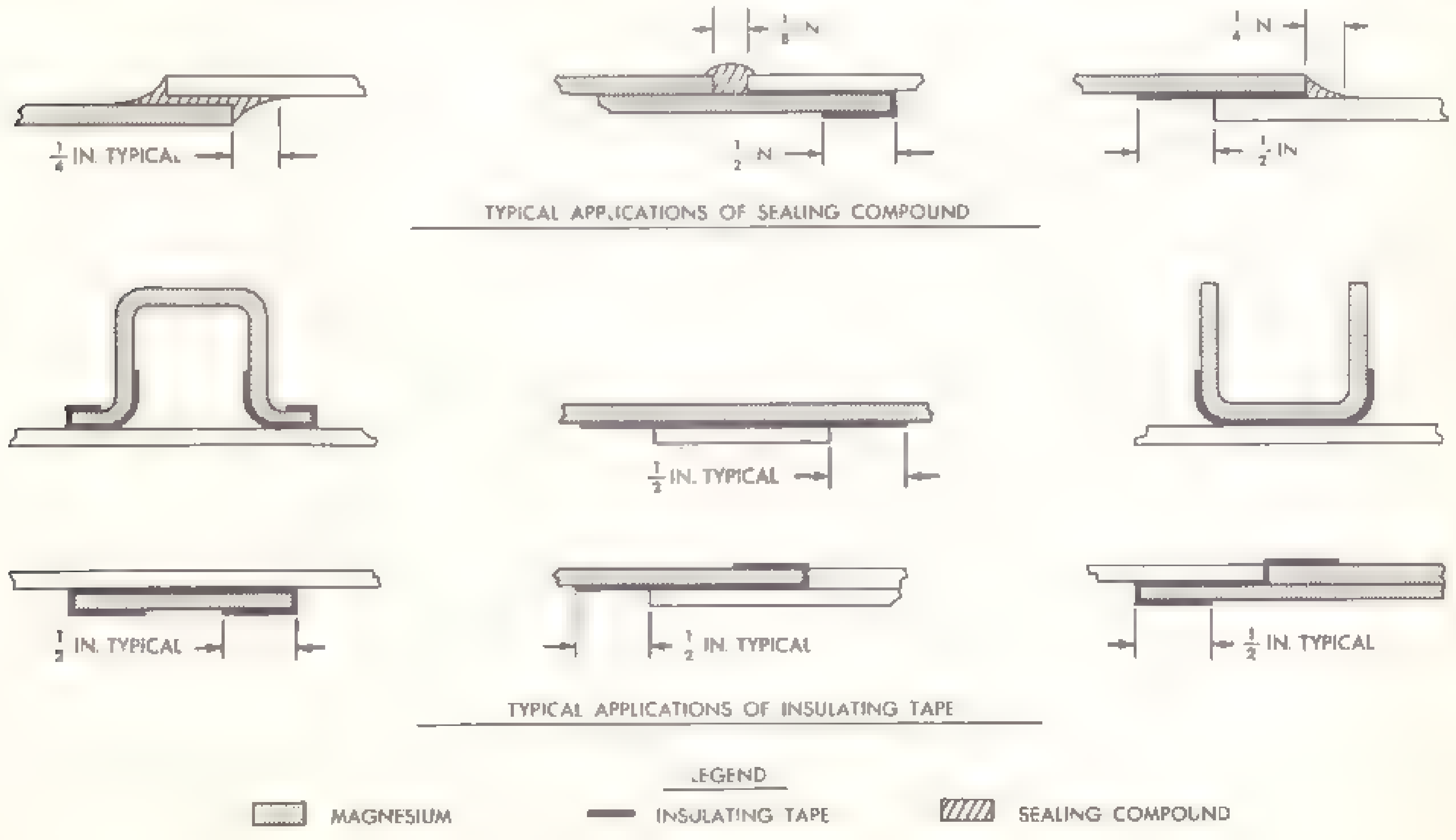


Figure 4–3. Application of insulating tape and sealing compound

squeezed out at all boundaries, and the excess removed so as to fillet all edges. Where the vinyl-plastic tape does not extend past lap joints, as on the exterior of the helicopter, the edge must be filleted with sealing compound. All fillet widths must be at least 1/4 inch. Butt joints, consisting of magnesium sheet and a dissimilar metal, must be protected by filling the groove with sealing compound. When there is no opening, the seam shall be grooved to a width of not less than 1/8 inch and filled with sealing compound. The sealing compound should be approximately flush with the surfaces of the adjacent dissimilar metals. For typical applications of sealing compound, see figure 4–3. The curing-type sealing compound should be prepared and applied in accordance with TM 55-405-3.

4–8. *Use of Aluminum Foil.* When the use of vinyl-plastic tape or sealing compound is impracticable due to mechanical damage, such as that caused by service temperatures over 149°C (300°F) for the vinyl-plastic tape and over 93°C (200°F) for the sealing compound, or other factors, use 5056 aluminum foil (item 33, table 1–8) for insulation. Where possible, the foil should extend approximately 1/4 inch, and in no case less than 1/8 inch, beyond the joint edge. Sealing compound (item 31, table 1–8) must be applied to inhibit the access of water. Areas which are to be insulated with aluminum foil must be treated with primer coating (item 19, table 1–8) prior to the application of the aluminum foil. It is recommended that the aluminum foil be applied, using adhesive (item 37, table 1–8).

4–9. *Use of Primer Coating.* In all areas where other methods of insulation, as described in paragraph 4–5*f*, are deemed impracticable, primer coating (item 19, table 1–8) shall be used to provide insulation between dissimilar metal contacts. All parts which form a dissimilar metal contact should be sprayed with primer coating prior to assembly. Primer coating of package consistency (unthinned) should be applied by brush to the joint during assembly; that is, coating bolts, washers, rivets, etc, before inserting through the metal. After the assembly, thoroughly seal the joint area with primer coating. This may be performed either by spraying the area or by brush-coating the area with unthinned primer coating.

4–10. *Maintenance of Plastic Surfaces.* Plastic surfaces will not corrode, but are highly susceptible to crazing, optical distortion, and scratches. Plastic surfaces shall be kept clean and maintained in such a manner as to avoid the destruction of its optical qualities. The following paragraphs give, in detail, the recommended procedures for maintaining plastic surfaces.

4–11. *Minor Repairs of Plastic Surfaces.* Minor repairs of plastic surfaces consist of removing small dents and nicks and minor scratches. Crazing is not repairable.

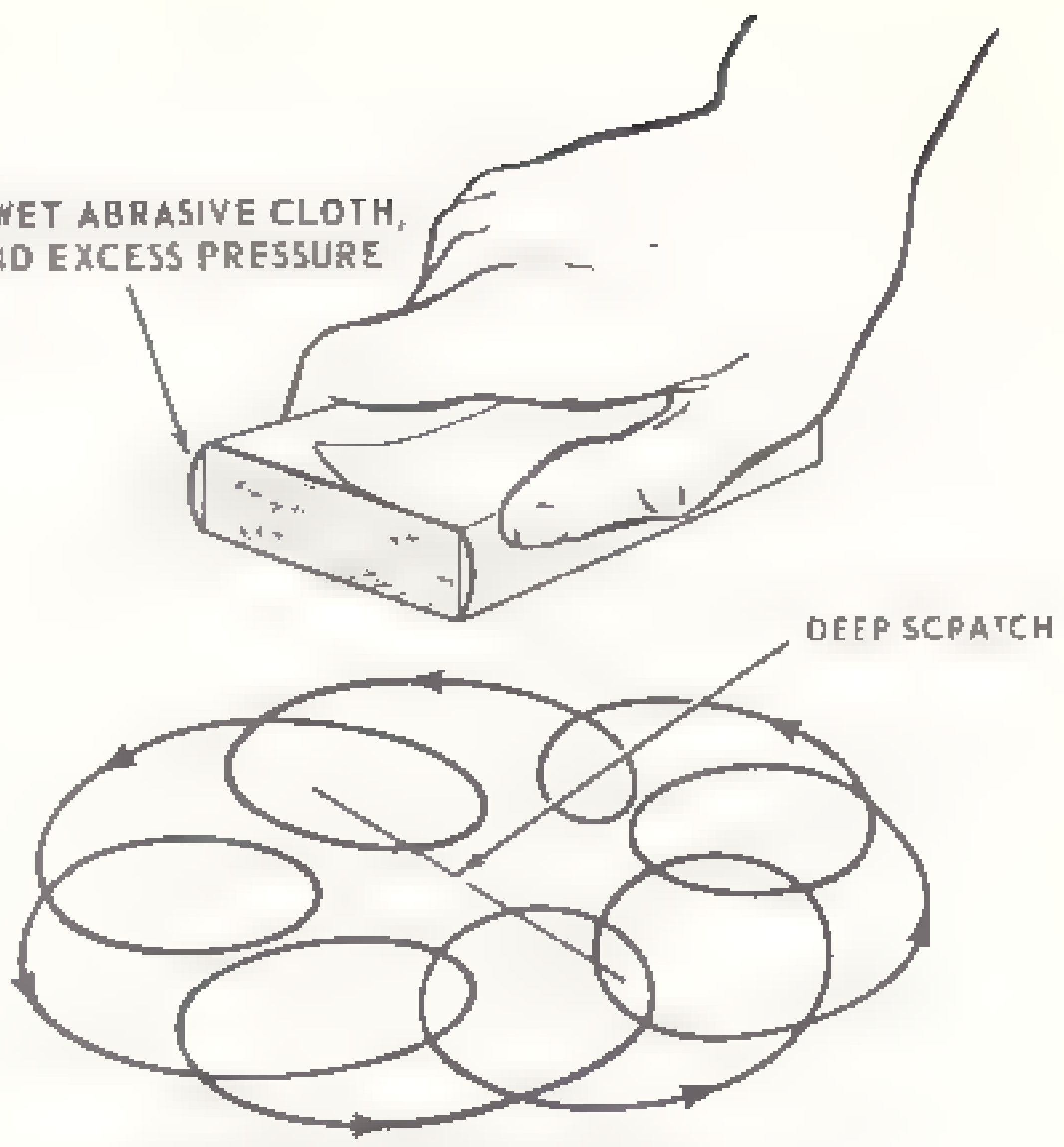


Figure 4–4. Proper sanding procedures for removing scratches

a. Removing small dents and nicks. Remove small dents and nicks by one of the following methods.

(1) *Hand sanding.* *(a)* Wrap No. 320 or finer cloth (item 38, table 1–8) around rubber pad or felt-covered wooden block. (See figure 4–4.)

(b) Wet cloth with water and rub affected plastic surface lightly, using a free circular motion with light hand pressure to avoid optical distortion. Constantly wet cloth to prevent scratches.

(c) Repeat sanding operation, using successively finer grades of cloth, until small dents and nicks have been removed.

(d) Flush plastic surface with water after each sanding operation.

(e) Polish plastic surface as outlined in paragraph (3) below.

(2) *Machine buffing.* *(a)* Clean affected plastic surface in accordance with cleaning instructions outlined in paragraph 1–64.

(b) Apply tallow (item 39, table 1–8) to buffing wheel for a few seconds, then apply buffing and polishing compound (item 40, table 1–8) on edge of buffing wheel for a few seconds.

(c) Hold buffing wheel lightly against affected plastic surface and move constantly in a circular motion until small dents and nicks disappear.

Caution

The friction created by buffing or polishing too long in one spot on acrylate base plastics can generate sufficient heat to soften the surface. This will produce visual distortion and must be avoided.

(d) Remove buffing compound from plastic surface and polish as outlined in paragraph (3) below.

(3) *Hand polishing. (a)* Apply buffing and polishing compound (item 40, table 1–8) to affected plastic surface with a lint-free, damp cloth.

(b) Rub plastic surface vigorously in a free circular motion. Avoid rubbing too long in one place.

(c) Allow buffing and polishing compound to dry, then remove with a soft, dry cloth.

b. Removing minor scratches. Remove minor scratches in accordance with the instructions outlined in paragraph *a* above.

4–12. Temporary Repairs of Plastic Surfaces. a. When a crack appears in a plastic surface, stop drill a hole at end of crack to prevent further cracking. Hole should be approximately 1/8 inch in diameter, depending on length of crack and thickness of plastic material.

b. Temporarily repair cracks in flat and contoured acrylic plastic surfaces in noncritical vision areas using one of the following type patching methods and in accordance with the applicable repair procedures outlined in TM 55-405-4.

(1) Transparent overlay plastic patch

(2) Lacing

(3) Plug

(4) Fabric overlay

Note

Temporarily repaired plastic surfaces shall be replaced as soon as possible.

Section II Fuselage Section

4–13. Description. The fuselage section is divided into the forward fuselage section and aft fuselage section (tail cone). The fuselage is of a semimonocoque design and constructed primarily of magnesium alloy, aluminum alloy, with some applications of titanium and stainless steel.

4–14. Fuselage Forward Section. The fuselage forward section consists of the engine compartment, clutch compartment, canopy installation, pilots' compartment, transmission compartment, cabin, cabin furnishings, electronics compartment, heater compartment, and cargo and personnel handling equipment.

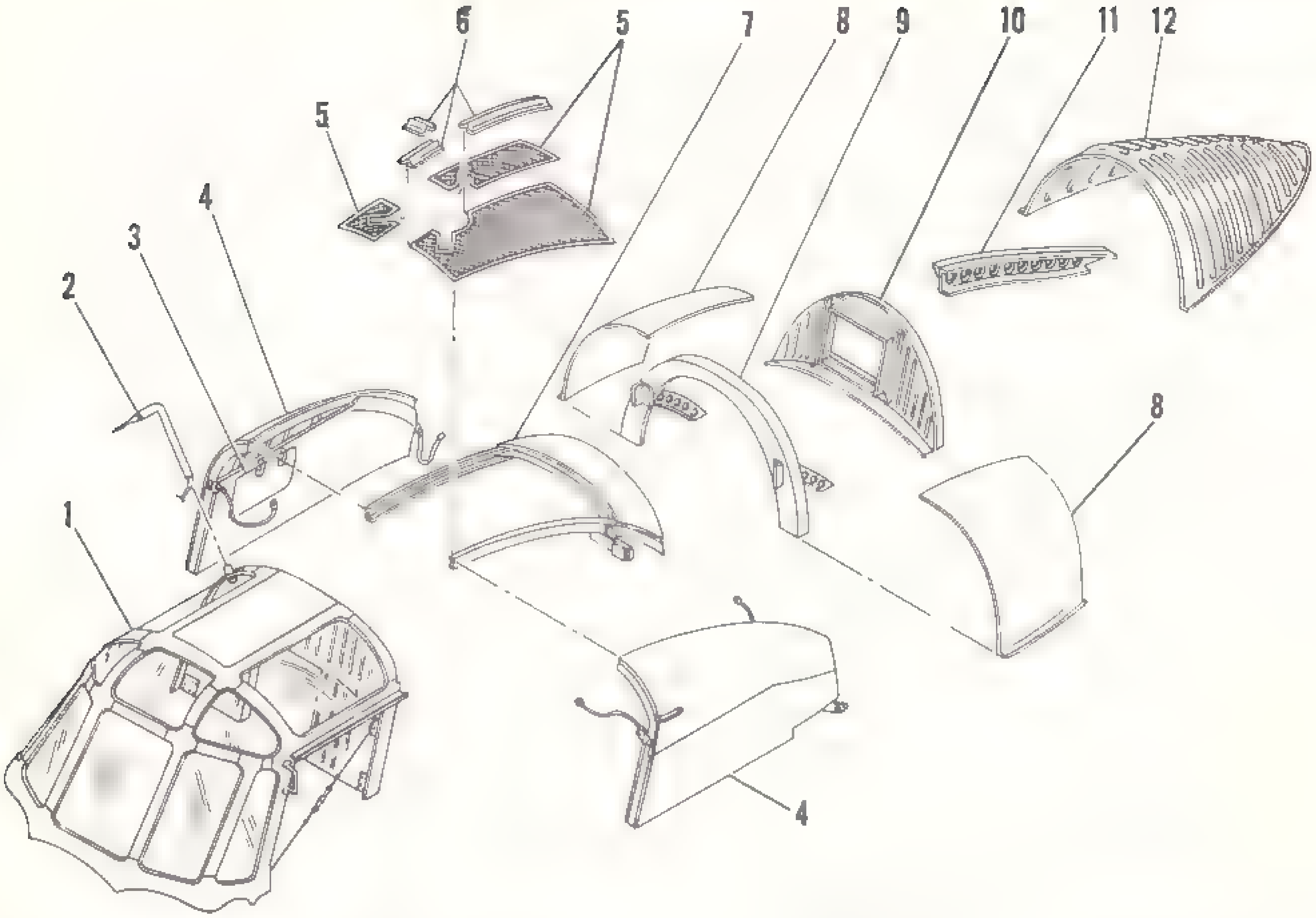
4–15. Engine Compartment. The engine compartment (1, figure 1–6) is located on the forward end of the forward fuselage section and is separated from the clutch compartment by a canted bulkhead. Access to the engine compartment is gained by opening the two clamshell-type nose doors.

4–16. Nose Doors. The two clamshell-type nose doors (figure 4–5) are attached by hinges to each side of the forward fuselage section to provide access to the engine compartment and form the nose of the helicopter. A small screen section covers the air exhaust area at the bottom of each nose door. A handle is installed in the center of each nose door and an additional latch is installed on the left nose door. The nose doors are secured open by turning the handles and swinging the nose doors all the way back on their hinges. Lock the nose doors in this position by pulling the lock rods free of the pan spring clips recessed in the fuselage skin and working the lock rods into the wedjit fittings on each nose door. The exhaust port is located in the lower aft section of the left nose door. On helicopters serial No. 57-1685 and subsequent antenna supports and nose door antennas are installed.

Caution

Use caution when opening nose doors during windy or gusty conditions. To preclude nose door or supporting structure damage, do not permit nose door to swing free and hit stop.

Figure 4–5 Nose doors open



1. Pilot's Compartment Canopy Assembly
2. Pitot Tube
3. Service Platform Door
4. Service Platform
5. Screens
6. Cap Strips
7. Fairing
8. Skin Assembly
9. Frame Assembly
10. Bulkhead
11. Fairing Beam
12. Louvered Fairing

Figure 4–7. Canopy installation

a. Cleaning. Clean windshield in accordance with paragraph 1–64.

b. Inspection. Inspect windshield for cracks, nicks, crazing, and optical distortion.

4–22. Sliding windows. Two sliding windows are installed in the pilots' compartment canopy assembly, one on each side. The sliding windows allow personnel to enter or leave the pilots' compartment by steps recessed in each side of the fuselage structure. The sliding windows also serve as jettisonable escape hatches in the event of an emergency. Each sliding window incorporates a slide assembly and a latch mechanism. The slide assembly, which is installed at the top of the window, allows the window to move forward and aft. The latch mechanism locks the window in the closed position or secures it open at 3-inch increments through the full range of travel. The sliding window is held in place at the top by studs or pins on the slide assembly, which engages the emergency release mechanism located inside the pilots' compartment canopy gutter. It is held at the bottom by a single long retainer. On helicopters serial No. 57-1685 and subsequent, two U-shaped fittings replace this single long retainer. The lower retainer or fittings act as a guide when sliding the window back and forth and also prevent any outboard movement of the window. Each window may be jettisoned, regardless of the position of the window in the slide assembly, by operating the emergency release handle. The handle is located at the forward end of the pilots' compartment canopy longeron above the window opening and can be operated from inside or outside the helicopter. The sliding window transparent panels may be removed for repair or replacement. Studs and spring clips are mounted on the window frame to provide attachment points for blind flying panels.

a. Removal. (1) Support sliding window on outside of helicopter.

(2) Move emergency release handle to unlocked position and hold in this position.

(3) Lower sliding window straight down until single long retainer or two U-shaped fittings disengage from lower track and remove sliding window.

b. Cleaning. Clean sliding windows in accordance with paragraph 1—64.

c. Inspection. (1) Inspect plastic panel of sliding windows for cracks, scratches, crazing, and optical distortion.

(2) Inspect slide assemblies and latch mechanisms for dents, burrs, and security of attachment.

d. Repair or replacement. Minor repair of plastic panel of sliding windows may be accomplished in accordance with paragraphs 4—10 through 4—12.

e. Installation. (1) Install sliding windows on helicopters serial No. prior to 57-1685 as follows:

(a) Move emergency release handle to unlocked position and hold.

(b) Postion sliding window on upper track and insert pins on upper track into holes in longeron at top of window opening.

(c) Move lower edge of sliding window against lower track. Guide edge of retainer, at bottom of window, up between two felt strips inside track. Push window up as far as it will go.

(d) Move emergency release handle very carefully toward locked position. Use as little pressure as possible. If pins on rod weld assembly hit pins on upper track, adjust position of window until it is determined that pins on rod weld assembly are aligned with holes in pins on upper track.

Caution

Under no condition should more than lightest pressure be applied to emergency release handle. Any attempt to force pins on rod weld assembly into holes in pins on upper track will cause possible bending of rod weld assembly, thereby preventing positive engagement of pins.

Note

If pins cannot be aligned, loosen screws that secure retainer at bottom of sliding window and push retainer down.

(e) When it has been determined that pins on rod weld assembly are aligned with holes in pins or upper track, move emergency release handle to locked position.

(f) Check adjustment of retainer at bottom of sliding window as outlined in paragraph *f*(1) below.

(2) Install sliding windows on helicopters serial No. 57-1685 and subsequent as follows:

(a) Move emergency release handle to unlocked position and hold.

(b) Raise window into position. Insert guide pins into holes in longeron at top of window opening. Inspect two bubble-shaped windows covering holes to obtain proper window alignment.

(c) Push emergency release handle toward locked position, locking four collar button studs within keyhole-shaped slots.

(d) Move lower edge of window against lower track. Engage two U-shaped fittings within track.

(e) Check adjustment of sliding window as outlined in paragraph *f*(2) below.

f. Adjustment. (1) Adjust lower retainers for sliding windows of helicopters serial No. prior to 57-1685 as follows:

Caution

This adjustment must be checked every time sliding window is installed or replaced. Failure to check this adjustment can result in loss of window in flight.

Note

The retainer at bottom of sliding window must be adjusted so a minimum of 5/16 inch of lip of retainer is above lower edge of lower track.

(a) Move sliding window almost to closed position.

(b) Check that a minimum of 5/16 inch of lip of retainer is above edge of lower track and that screws that secure retainer are tight.

Note

If checks in step *(b)* are satisfactory, steps *(c)* through *(e)* may be omitted.

(c) Loosen screws that secure retainer.

(d) Push retainer up as far as it will go. Tighten screws to secure retainer in this position.

(e) Recheck dimensions outlined in step *(b)* above. Readjust, if necessary.

(f) Slide window back and forth several times to check for smooth, secure operation.

(2) Adjust lower fittings on sliding windows of helicopters serial No. 57-1685 and subsequent as follows:

Note

The two fittings on each end at the bottom of the sliding window must engage the lower track to insure proper operation of the sliding window.

(a) Push window up as far as it will go.

(b) Remove screws and washers securing bottom fittings to window frame. Slide fittings either up or down depending upon adjustment needed.

(c) Secure fittings with screws and washers.

(d) Slide window back and forth several times to check for smooth and secure operation.

4–23. Fixed Windows. There are five fixed windows installed in the pilots' compartment canopy assembly (1, figure 4–7). Each fixed window has a transparent plastic panel installed.

a. Removal. Remove each fixed window as follows:

(1) Remove screws, washers, and nuts securing retainers on fixed window.

(2) Remove retainers, rubber edging, and fixed window from skeleton of pilots' compartment canopy assembly.

b. Cleaning. Clean fixed windows in accordance with paragraph 1–64.

c. Inspection. Inspect fixed windows for cracks, nicks, dents, scratches, crazing, and optical distortion.

d. Installation. Install fixed windows as follows:

(1) Position fixed window in skeleton of pilot's compartment canopy assembly and rubber edging on fixed window.

(2) Position retainers on rubber edging and secure with screws, washers, and nuts.

4–24. Service Platforms. The service platforms (4, figure 4–7) are hinged to the cabin longeron and the transmission deck and function as protective panels for the transmission compartment when locked in the closed position. When unlocked, each service platform swings down and away from the canopy. Support cables position the platform at an advantageous level for servicing the canopy installation, main transmission, and main rotor. A service platform door (3) is installed in the right service platform to provide clearance for the rescue hoist when the service platform is hinged down.

a. Removal. (1) At each side of canopy installation, support service platform (4, figure 4–7) and detach each support cable from pilots' compartment canopy canted bulkhead and frame assembly (9).

(2) Close and lock service platform against canopy installation, slide hinge pin forward out of hinge, and remove clevis bolt at hinge fitting extending out from contour of canopy skin.

(3) Unlock service platform and lift it off canopy installation.

b. Disassembly. (1) Detach support cables from service platforms by removing cotter pins, bolts, washers, and nuts securing cables to platforms.

(2) At each platform latch aft support, remove cotter pin, bolt, washers, and nut securing arm to support. Disconnect spring from tubing aft section and platform frame. Remove cotter pins, pins, and washers, which attach tubing sections to arm and remove tubing aft section arm, washer, and spacer from each platform.

(3) At each forward support, remove bolt, washers, and nut which secure lever to support. Remove cotter pins, and washers attaching lever to handle lever assembly and tubing forward section. Remove tubing forward section, latch pin, and lever from each platform.

(4) Disconnect spring from each handle lever assembly and from each support located above handle attachment point. Remove rollpins inboard and outboard of platform skin contour. Slide handle and tubing sections out from platform and remove lever assembly from forward frame.

(5) Remove bolts, washers, nuts, and springs which secure service platform door (3, figure 4–7) to right service platform. Remove door.

Note

On helicopters serial No. 53-4503 and subsequent a door stop on the transmission deck replaces the door springs. To replace the door stop, remove the bolts, washers, and nuts which secure it to the deck.

c. Cleaning. Clean service platforms in accordance with paragraph 1–62.

d. Inspection. Inspect components of service platforms for cracks, dents, corrosion, and elongated mounting holes.

e. Repair or replacement. (1) Replace all bent, broken, and otherwise damaged component parts.

(2) Replace all cotter pins and stripped or malformed attaching hardware.

f. Reassembly. (1) Position service platform door (3, figure 4–7) in opening of right service platform (4) and secure it with bolts, washers, nuts, and springs.

Note

On helicopters serial No. 53-4503 and subsequent a door stop on the transmission deck replaces the door springs. To install the door stop, position it on the deck and secure with bolts, washers, and nuts.

(2) Position each handle lever assembly at platform forward frame with inboard tubing section. Slide outboard tubing section and handle in place and secure handle and lever assembly to tubing with rollpins. Install spring at handle lever assembly and at frame support above handle.

(3) Install each lever at latch forward support with bolt, washers, and nut. Position and secure each tubing forward section and lockpin at lever with pin, washers, and cotter pin. Connect lever to handle lever assembly with the pin washers, and cotter pin.

(4) Secure spacer, washer, and arm at each latch aft support with bolt, washers, nut, and cotter pin. Connect tubing sections at arm with pins, washers, and cotter pins. Attach spring to tubing aft section and to platform frame.

(5) Secure support cables on each platform with bolts, washers, nuts, and cotter pins.

g. Installation. (1) Position and lock each service platform (4, figure 4–7) against canopy installation.

(2) Install clevis bolt at hinge fitting extending out from contour of canopy skin and slide hinge pin aft into hinge at bottom of platform.

(3) Support service platform and unlock and swing platform down. Install each support cable at pilots' compartment canopy canted bulkhead and frame assembly (9).

(4) Close and lock each service platform (4).

4–25. Pilots' Compartment. The pilots' compartment (4, figure 1–6) is enclosed by the pilots' compartment canopy assembly and separated from the clutch compartment and cabin by a firewall and pilots' compartment floor. The pilots' compartment is separated from the main transmission by a canted bulkhead, which is covered with soundproofing. The furnishings for the pilot's compartment consist of the pilot's seat (4, figure 4–8), copilot's seat (36), shoulder harnesses (15 and 30), safety belts (11 and 34) inertia reels (12), ash trays (2 and 6), first aid kit (16), map case and flight report holder (17), data case (20), assist handles (1), pilot's checklist (5), and tinted panels (9). Access to the pilots' compartment is gained either through the sliding window on each side of the pilots' compartment canopy assembly or access ladders in the cabin.

4–26. Pilot's and Copilot's Seats. The pilot's and copilot's seats (4 and 36, figure 4–8) are mounted on support fittings or tracks secured to the bulkhead at rear of pilots' compartment. Each seat bucket can be folded up against the seat back to permit entry to the pilots' compartment by the access ladders installed on the forward bulkhead in the cabin. Each seat is equipped with a seat and back cushion, safety belt, shoulder harness and inertia reel. Each seat may be lowered or raised by pulling up on the adjustment handle, located on the right side of the pilot's seat or the left side of the copilot's seat, which disengages the seat lockpins from the support fittings or tracks. A bungee cord aids in raising or lowering each seat.

a. Removal. Remove pilot's and copilot's seats (4 and 36, figure 4–8) as follows:

(1) Remove screws securing control of inertia reel to bracket on frame at left side of copilot's seat. Tape control to copilot's seat.

(2) Remove screws, washers, and nuts securing control of inertia reel for pilot's seat to fitting on main drive shaft tunnel. Remove bolts and washers securing fitting on main drive shaft tunnel. Tape fitting and control to pilot's seat.

Note

On helicopters serial No. 57-1747 and subsequent remove screw, washer, nut, and clamp securing control cable to main drive shaft tunnel.

(3) Unhook bungee cords from each seat back support tube. Remove bolt, washer, spacer, and nut securing each bungee cord to bulkhead. Remove bungee cords.

(4) Pull up on adjustment handle to free lockpins from support fittings or tracks. Slide each seat up and remove from support fittings or tracks.

(5) Remove inertia reel from pilot's and copilot's seats. (Refer to paragraph 4–28*a*, steps (2) through (6).)

(6) Remove safety belts and shoulder harnesses from pilot's and copilot's seats. (Refer to paragraph 4–27*a*.)

(7) Unsnap and remove seat and back cushions from pilot's and copilot's seats.

Note

Seat bucket may be removed separately, when removal of the entire seat is not necessary by removing bolts, washers, and nuts from fitting on each side of seat bucket and remove seat bucket from fittings.

b. Cleaning. (1) Clean pilot's and copilot's seat cushions with a clean cloth slightly moistened with water. Dry with a clean, dry cloth.

(2) Remove grease from pilot's and copilot's seat cushions with a clean cloth slightly moistened in solvent (item 4, table 1–8). Wipe all traces of solvent from seat cushion with a clean, dry cloth.

c. Inspection. (1) Inspect pilot's and copilot's seat frames for cracks, dents, and bends.

(2) Inspect seat and back cushions for cuts, tears, fraying, deterioration, and cleanliness.

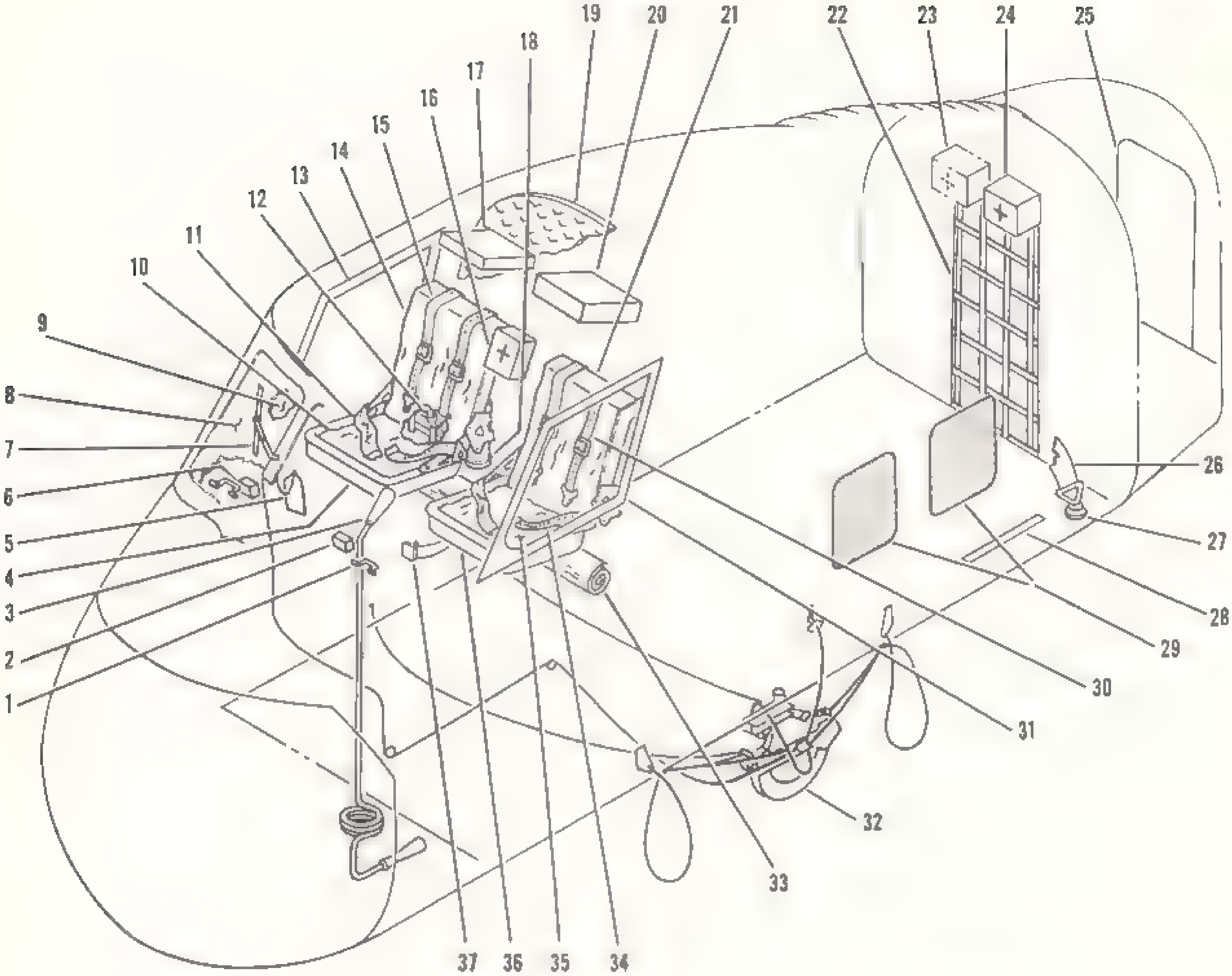
d. Installation. Install pilot's and copilot's seats (4 and 36, figure 4–8) as follows:

(1) Install an inertia reel (12) on pilot's and copilot's seats. (Refer to paragraph 4–28*c* steps (1) through (6).)

(2) Position end of each bungee cord on bulkhead and secure with bolts, washers, spacers, and nuts.

(3) Position pilot's and copilot's seats at bulkhead and hook bungee cords to seat back support tubes.

(4) Hold adjustment handle up in unlocked position. Lift pilot's and copilot's seats and slide back fit-



1. Assist Handle
2. Ash Tray
3. Relief Tube
4. Pilot's Seat
5. Pilot's Checklist
6. Ash Tray
7. Windshield Wiper
8. Windshield
9. Tinted Panels (Blind Flying)
10. Seat Cushion
11. Safety Belt
12. Inertia Reel
13. Sliding Window
14. Back Cushion
15. Shoulder Harness
16. First Aid Kit
17. Map Case and Flight Report Holder
18. Fire Extinguisher
19. Soundproofing
20. Data Case
21. Back Cushion
22. Personnel Barrier
23. First Aid Kit Provision
24. First Aid Kit
25. Seal
26. Cargo Tiedown Belt
27. Cargo Tiedown Fitting
28. Skid Rail
29. Blackout Curtain
30. Shoulder Harness
31. Sliding Window
32. Cargo Release Hook (Stowed)
33. Antiglare Curtain (Rolled)
34. Safety Belt
35. Seat Cushion
36. Copilot's Seat
37. Air Safety Harness

Figure 4—8. Forward fuselage section furnishings and equipment

tings into support fittings or tracks. Release adjustment handle to secure pilot's and copilot's seats in support fittings or tracks with lockpins.

(5) Position control of inertia reel to bracket on frame at left side of copilot's seat and secure with screws.

(6) Position fitting, for attaching control of inertia reel, on main drive shaft tunnel and secure with bolts and washers. Position control on fitting and secure with screws, washers, and nuts.

Note

On helicopters serial No. 57-1747 and subsequent secure control cable to main drive shaft tunnel with clamp, screw, washer, and nut.

(7) Position seat and back cushions on pilot's and copilot's seats and snap to seat frames.

(8) Install safety belts and shoulder harnesses. (Refer to paragraph 4–27*d*.)

(9) Lubricate pilot's and copilot's seats in accordance with figure 2–1.

e. Testing. With pilot's and copilot's seats in fully up position and adjusting handle pulled up, a force of 135 to 140 pounds applied to center of each seat should move seats free of fully up position.

4–27. Shoulder Harnesses and Safety Belts. The shoulder harnesses (15 and 30, figure 4–8) and safety belts (11 and 34) are installed on the pilot's and copilot's seats (4 and 36) in the pilots' compartment. Each shoulder harness is attached to an inertia reel (12) behind each seat, then extended forward and over the back of each seat and fastened to the safety belt. The safety belts are secured to a fitting between the seat bucket and back of each seat and are adjustable in length. When not in use, the safety belts are stowed by hanging each loose end on the S-hooks at the upper end of the bungee cords.

a. Removal. (1) Remove bolts, washers, and nuts securing safety belts to fittings on pilot's and copilot's seats. Remove safety belts.

(2) Remove bolt, washers, and nut securing fitting of each shoulder harness to link on cable of inertia reel. Remove shoulder harnesses.

b. Cleaning. Clean shoulder harnesses and safety belts in accordance with TM 55-405-3.

c. Inspection. Inspect shoulder harnesses and safety belts for fraying, broken threads, and worn spots.

d. Installation. (1) Position ends of each safety belt on fitting on each side of pilot's and copilot's seats and secure with bolts, washers, and nuts.

Warning

Install each safety belt with release handle pointing left. Position belt end fittings on inner sides of seat fittings and insert bolts from right.

(2) Position shoulder harness over back of each seat. Connect fitting of each shoulder harness to link on cable of inertia reel with bolt, washers, and nut.

4–28. Inertia Reels. An inertia reel (12, figure 4–8) is installed on the back of the pilot's and copilot's seats in the pilots' compartment. Each inertia reel consists of a reel, control, and control cable. The control located on the left side of the copilot's seat or right side of pilot's seat actuates the reel on the back of the seats through the control cables. The reel cable is attached to the shoulder harness and locks automatically or manually at each 1/2 inch of extension. The control has two positions, manual and automatic. In the automatic or aft position, the reel cable is free to extend and permit the occupant of the seat to lean forward. In emergencies, a force of 2 or 3 g's will automatically lock the reel and the reel will take up slack if the cable is extended. When the reel is locked in this manner, it remains locked until the control lever is placed in the manual lock or forward position and then returned to the aft position. The manual or forward control position, in which the occupant of the seat is prevented from being thrown forward, should be used only when a crash landing is anticipated. During normal flight the control should be in the automatic position.

a. Removal. (1) Remove controls for inertia reels and pilot's and copilot's seats. (Refer to paragraph 4–26*a*, steps (1) through (4).

(2) Place control handle in automatic position.

(3) Back off nut at each end of control cables until it is clear of case of controls and reels.

(4) Lift ends of control cables from sockets of shafts inside case of controls and reels. Remove horseshoe washer from each groove of control cables and slide each nut off of control cables.

(5) Remove bolts, washers, and nuts securing fittings of shoulder harnesses on links of reel cables.

(6) Remove bolts, washers, and nuts securing case of reel on back of pilot's and copilot's seats and remove reels.

b. Inspection. (1) Inspect control cables and reel cables for broken wires, worn spots, and corrosion; and cable end fittings for elongated bolt holes.

(2) Inspect case of control and reel for cracks, dents, bends, and elongated mounting holes.

c. Installation. (1) Position reels on back of pilot's and copilot's seats and secure with bolts, washers, and nuts.

(2) Position fittings of shoulder harnesses on links of reel cables and secure with bolts, washers, and nuts.

(3) Place control handle in automatic position.

(4) Slide nuts over ends of control cables and place horseshoe washers in each groove of control cables.

(5) Place ends of control cables in sockets of inner shaft of cases of control and reel.

Note

Ends of control cables must seat in shafts in order for the control cables to function properly.

(6) Slide each nut on control cables onto threads of case of control and reel. Tighten nuts to a torque of 30 inch-pounds.

(7) Install pilot's and copilot's seats and controls of inertia reels. (Refer to paragraph 4–26*c*, steps (2) through (9).

4–29. Ash Trays. There are two ash trays (2 and 6, figure 4–8) located beneath the instrument panel in the pilots' compartment. One ash tray is located in front of

the pilot and the other in front of the copilot. The mounting brackets for the ash trays are riveted beneath the instrument panel and cannot be removed. Each ash tray is removed in the conventional manner.

4–30. First Aid Kit. The first aid kit (16, figure 4–8) located in the pilots' compartment is mounted on the door for the auxiliary servo and mixer assemblies between the pilot's and copilot's seats. The first aid kit can be removed by unsnapping the fasteners.

4–31. Map Case and Flight Report Holder. The map case and flight report holder (17, figure 4–8) is mounted on the bulkhead above the pilot's seat and secured to a bracket mounted on the pilots' compartment ceiling.

a. Removal. Remove screws, bolt, washer, and nut securing map case and flight report holder to bulkhead and bracket. Remove map case and flight report holder.

b. Installation. Position map case and flight report holder on bulkhead and bracket and secure with screws, bolt, washer, and nut.

4–32. Data Case. The data case (20, figure 4–8) in the pilots' compartment is located on the bulkhead above the copilot's seat and to the left of the overhead control panel.

a. Removal. Remove screws, bolts, washers, and nuts securing data case to bulkhead and bracket mounted on pilot's compartment ceiling. Remove data case.

b. Installation. Position data case on bulkhead and bracket and secure with screws, bolts, washers, and nuts.

4–33. Assist Handles. Two assist handles (1, figure 4–8) are provided to aid the pilot and copilot in climbing up into the pilots' compartment from the cabin. The assist handles are located on the torque tube of the control pedals, forward of the pilot's and copilot's seats.

a. Removal. Remove bolts, washers, and nuts securing assist handles on torque tube of control pedals, and remove assist handles.

b. Installation. Position assist handles on torque tube of control pedals and secure with bolts, washers, and nuts.

4–34. Pilot's Checklist. The pilot's checklist (5, figure 4–8) is attached by a chain to the right side of the instrument panel. The chain allows the pilot to use the checklist while seated.

a. Removal. Remove screw and washer securing end of chain to instrument panel and remove checklist.

b. Installation. Position end of chain of checklist on instrument panel and secure with screw and washer.

4–35. Tinted Panels. The tinted panels (9, figure 4–8) of amber-tinted plastic are used for training purposes. The tinted panels are installed over the windshield panels and the sliding window on each side of the pilots' compartment. The tinted panels are secured in position by snap fasteners. One set of tinted panels with storage and carrying case are provided for every seven helicopters.

4–36. Transmission Compartment. The transmission compartment (5, figure 1–6) is located aft of the bulkhead of the pilots' compartment and above the forward end of the cabin. The transmission compartment is enclosed by the two service platforms (4, figure 4–7) of the canopy installation. The main transmission, hydraulic, electrical, and flight control components are mounted on the transmission deck in the transmission compartment.

4–37. Cabin. The cabin (6, figure 1–6) is located below the pilots' compartment and transmission compartment. The cabin is separated from the clutch compartment at the forward end and the electronics compartment at the aft end by bulkheads. The cabin is entered through the cargo door (figure 4–9) on the right side of the cabin. Four windows are installed in the cabin, two in the emergency escape hatches on the left side of the cabin, one in the cargo door, and one aft of the cargo door on the right side of the cabin. The cabin floor is constructed of two aluminum sheets with a honeycomb core of aluminum foil between the sheets. The access covers for the fuel cells are installed on the cabin floor for easy access to the fuel cells. On helicopters serial No. 53-4475 through 54-3050 and 56-4274 and subsequent an access door for the observation window is installed in the cabin floor. The observation window is installed on the lower fuselage structure of the cabin.

4–38. Cargo Door. The cargo door (figure 4–9) is the sliding type, installed on the right side of the cabin. The cargo door is held in the closed position by a hand-operated latch and has one window installed in the upper center of the door. The cargo door can be jettisoned from inside or outside of the cabin by pulling on the emergency release handle and either pulling or pushing the cargo door out of position. On helicopters serial No. 54-3026 and subsequent a flexible plastic guard is installed over the emergency release handle to prevent accidental jettisoning of the cargo door. The guard is cemented to the cargo door and is designed to break when pulled, allowing quick operation of the emergency release handle.

a. Removal. (1) Unlatch cargo door from cargo door frame.

Figure 4–9. Cargo door

(2) Release cargo door from track assembly by pulling inside or outside emergency release handle down far enough to back cargo door rod out of door angles and track support assemblies.

(3) Support cargo door and hold emergency release handle in an unlocked position, move cargo door free from gutter above track assembly. Insure that channel at bottom of cargo door is free from rail secured to bottom structure.

(4) Pull or push cargo door out and remove from cabin.

b. Cleaning. (1) Clean track, bearings, and inner races with solvent (4, table 1–8) and dry with filtered compressed air.

(2) Clean surfaces of cargo door in accordance with paragraph 1–62.

c. Inspection. (1) Inspect cargo door for cracks, dents, bends, and loose or missing rivets.

(2) Inspect inner races for damage, dirt, or other foreign matter.

(3) Inspect channel on bottom of cargo door to insure that it is secure.

d. Lubrication. Apply grease (item 29, table 1–8) sparingly to all contacting surfaces of ball cage, inner races, and housing of track.

e. Installation. (1) Unlock emergency release handle and position upper edge of cargo door into track assembly. Lock emergency release handle.

Caution

When moving emergency release handle toward locked position, visually inspect and be certain that support assemblies on inner races fit door angles and that holes align evenly with door angles. Make certain that ends of cargo door rods go through all three holes at three stations where door angles and supports are located.

(2) Loosen attaching screws on channel at bottom of cargo door and allow channel to drop down. Push bottom of cargo door against fuselage and move channel up and under rail that is secured to fuselage. Tighten screws.

(3) Latch cargo door at cargo door frame.

(4) Inspect channel on bottom of cargo door to see that it fits snugly against rail. If adjustment is necessary, refer to paragraph *f* below.

f. Adjustment. Only two adjustments can be made on the cargo door, adjustment of the channel on the bottom of the cargo door and adjustment of the striker plate on the fuselage.

(1) To adjust channel, loosen attaching screws in elongated slots and, holding mirror first at one end of channel and then at other, position channel up and under rail. Push channel up firmly against rail and tighten screws in elongated slots.

Caution

This adjustment must be made every time cargo door is installed. Inattention to this adjustment may result in loss of cargo door in flight.

(2) To adjust striker plate which is located on fuselage, opposite cargo door latch, loosen two hex-head bolts and slide entire striker assembly back and forth until it holds latch securely. Close and open cargo door after each movement. Tighten two hex-head bolts.

(3) Open and close cargo door several times to be certain that latch fastens securely over strike plate. If latch strikes strike plate but does not fasten, repeat step (2).

4–39. Emergency Escape Hatches. Two emergency escape hatches (figure 4–10) are installed in the left side of the cabin with a window installed in each emergency escape hatch. An emergency release handle is installed on the lower forward corner of each emergency escape hatch on the inside and outside of the cabin. Two assist handles are installed directly above each emergency escape hatch on the outside of the cabin fuselage to aid personnel in leaving the cabin through the emergency escape hatches.

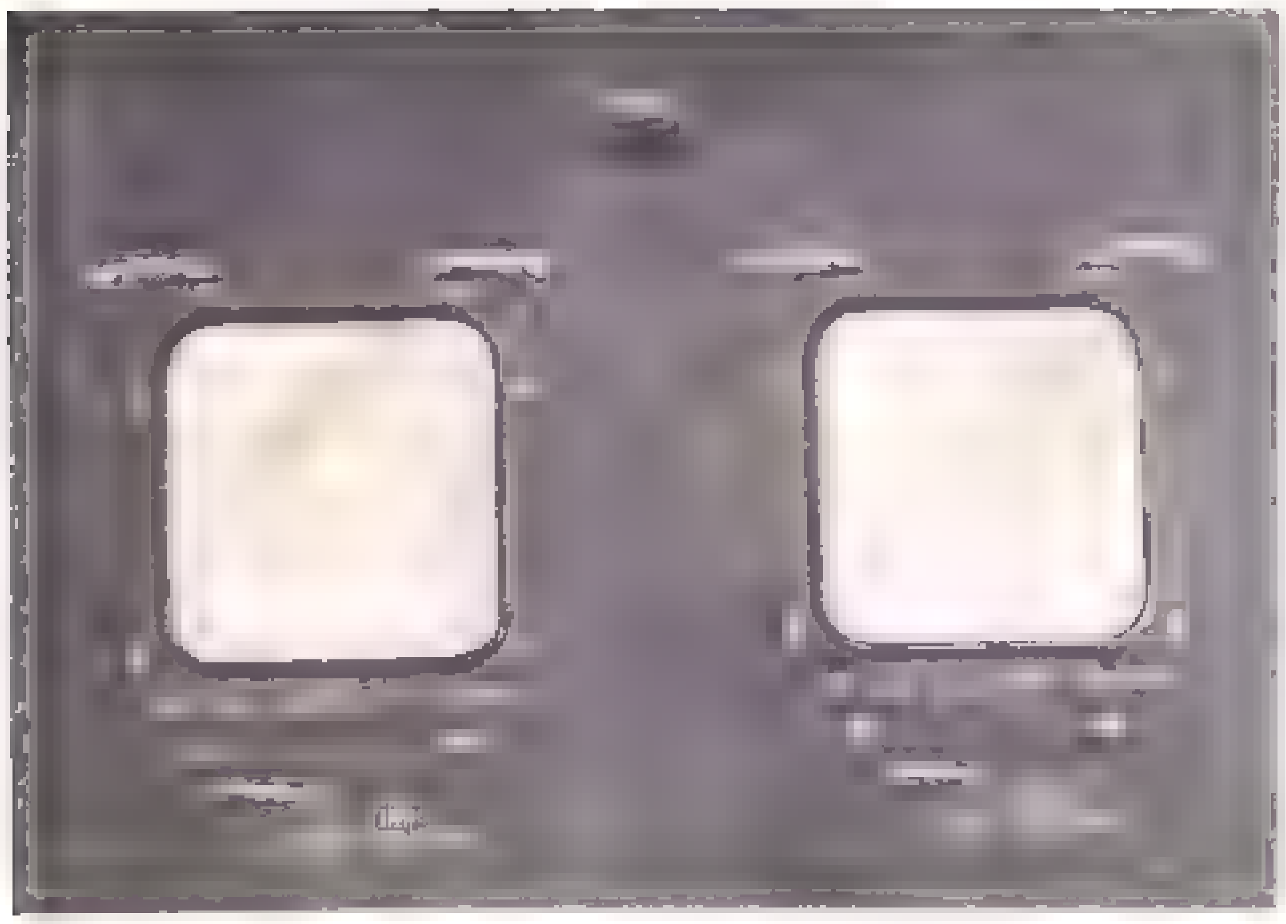


Figure 4—10. Emergency escape hatches

a. Removal. Push emergency release handle down on outside or push inside handle forward, then up. Pull or push emergency escape hatches out of fuselage.

b. Cleaning. (1) Clean emergency escape hatches in accordance with paragraph 1—62.

(2) Clean windows of emergency escape hatches in accordance with paragraph 1—64.

c. Inspection. (1) Inspect emergency escape hatches for cracks, dents, bends, and loose or missing rivets.

(2) Inspect windows of emergency escape hatches for scratches, cracks, crazing, and optical distortion.

d. Lubrication. Apply grease (item 29, table 1—8) sparingly to all contacting surfaces of emergency escape hatches.

e. Installation. (1) Position emergency escape hatches in fuselage, engaging lugs at top of each hatch in fuselage channel slots.

(2) Pull outside emergency release handle up or inside handle aft and down to locked position.

(3) Operate emergency release handle and check for proper operation, then lubricate in accordance with paragraph *d* above.

4—40. Cabin Windows. Four plastic cabin windows are installed in the cabin. The two cabin windows located on the left side of the cabin are installed in the two emergency escape hatches. (See figure 4—10.) One of the two cabin windows located on the right side of the cabin is installed in the cargo door (figure 4—9); the other is installed in the skin of the cabin aft of the cargo door.

a. Removal. Remove each cabin window as follows:

(1) Remove filler strip from each cabin window, using a suitable tool.

Note

To remove filler strip from right aft cabin window located in fuselage skin, pull strap assembly secured to fuselage skin out from seal. Pull remainder of the filler away from seal.

(2) Remove cabin window and rubber seal from window frame.

b. Cleaning. Clean cabin windows in accordance with paragraph 1—64.

c. Inspection. Inspect cabin windows for scratches, cracks, crazing, and optical distortion.

d. Repair or replacement. Perform minor repair of cabin windows in accordance with paragraphs 4—10 through 4—12.

e. Installation. Install each cabin window as follows:

(1) Install rubber seal in window frame using a suitable tool.

(2) Install cabin window in rubber seal.

(3) Insert filler strip in rubber seal around cabin window with a suitable tool.

Note

At aft right cabin window located in fuselage skin, work strap assembly into the rubber seal while inserting filler strip.

4—41. Cabin Floor. The cabin floor is composed of panel assemblies mounted on to the skeleton assembly of the fuselage. Cargo tiedown fittings, skid rails, and access covers for the fuel cells are installed on the panel assemblies. The access door for the observation window is installed in the center panel assembly.

a. Removal. (1) Remove troop seats. (Refer to paragraph 4—44*c* or 4—45*c*.)

(2) Remove skid rails, as necessary, from panel assemblies.

(3) Remove bolts, washers, and nuts that secure filler cap, gasket, and elbow to scupper at forward, center, and aft fuel tank fillers. Remove each filler cap and gasket.

(4) Disconnect vapor return line from union in forward tank filler elbow.

(5) Remove bolts and washers that secure each elbow to panel assembly. Remove each elbow and gasket.

(6) Remove bolts and washers that secure forward, center, and aft fuel cell access covers to panel assemblies. Remove covers and gaskets. Remove screws that secure each fuel cell cover support to bottom surface of panel assemblies.

(7) Remove all bolts and washers that secure panel assemblies to keel beams, forward hatch frame, bulkheads, and longerons. Lift panel assemblies off bottom structure.

Note

When removing panel assembly, check that seccuring bolts of tiedown fittings in adjacent panel assembly are removed.

(8) Remove gasket and spacer from each fuel tank filler hole.

b. Cleaning. Clean panel assemblies of cabin floor in accordance with paragraph 1–63.

c. Inspection. Inspect panel assemblies of cabin floor for cracks, dents, bends, and corrosion.

d. Installation. (1) Install spacer and gasket at fuel tank filler hole in each panel assembly with spacer against bottom surface of panel assembly.

(2) Position each panel assembly and secure it to bottom structure keel beams, forward hatch frame, bulkheads, and longerons with bolts and washers.

Note

Secure tiedown fittings of each panel assembly to adjacent panel assembly with bolts.

(3) Secure each fuel cell cover support to bottom surface of panel assembly with screws. Secure each gasket and fuel cell access cover to top surface of panel assembly with bolts and washers.

(4) Position each fuel tank filler elbow on the gasket at filler elbow and secure it with bolts and washers. Secure bolts with lock wire.

(5) Install gasket between each filler elbow and scupper. Position filler cap and gasket against outer surface of each scupper. Secure filler cap, gaskets, and elbow to each scupper with bolts, washers, and nuts.

(6) Connect vapor return line to union in forward tank filler elbow.

(7) Install any skid rails removed from panel assemblies.

(8) Install troop seats. (Refer to paragraph 4–44*f* or 4–45*f*.)

4–42. Observation Window. The observation window is mounted in the lower fuselage structure below the cabin floor, and an access door is installed in a panel assembly of the cabin floor. The observation window provides an unobstructed view of the cargo sling and the ground. Through the intercom system, a crewmember directs the pilot when maneuvering the helicopter during cargo or personnel hoisting operation.

a. Removal. Remove screws and washers securing retainer on observation window. Remove retainer and observation window.

b. Cleaning. Clean observation window in accordance with paragraph 1–64.

c. Inspection. Inspect observation window for cracks, scratches, crazing, and optical distortion.

d. Installation. Position observation window and retainer in lower fuselage structure and secure with screws and washers.

4–43. Cabin Furnishings. The cabin furnishings consist of 12- or 18-place troop seats, or litter installation, personnel barrier, first aid kit, blackout curtains, canteen installation, stowage bag, cargo tiedown belts, and relief tubes. For the location of the cabin furnishings see figure 4–8.

4–44. Twelve-Place Troop Seats. The 12-place troop seats (figure 4–11) are installed in the cabin on helicopters serial No. prior to 56-4313. A three-place troop seat and a two-place troop seat are installed against the right cabin wall. Two three-place troop seats and a one-place troop seat are installed against the left cabin wall. A safety belt is installed for each place on a troop seat. The aft section of the two-place troop seat extends into the cargo door opening and can be folded forward over the forward section of the troop seat to provide clearance for use of the cargo door opening. Quick access to the emergency escape hatches in the left cabin wall and window in right cabin wall is gained by pulling the seat back support tube of each three-place troop seat inboard from support fittings on the cabin wall. This action releases the seat back support tubes from the friction catches and permits the seat backs to drop down and away from the emergency escape hatches and window.

1. Support Fitting
2. Bolt, Washers, Nut
3. Support Fitting
4. Back Strap Hook
5. Seat Back Support Tube
6. Seat Rear Support Tube
7. Spreaders
8. Bolt, Washers, Nut
9. Support Fitting
10. Bolt, Washer
11. Bolt, Washers, Nut
12. Support Fitting
13. Bolt, Washer
14. Seat Rear Support Tube
15. Eyebolt Ring
16. Safety Belt
17. Seat Front Support Tube
18. Tiedown Fitting
19. Support Leg

Figure 4–11. Twelve-place troop seat installation (Sheet 1 of 2)

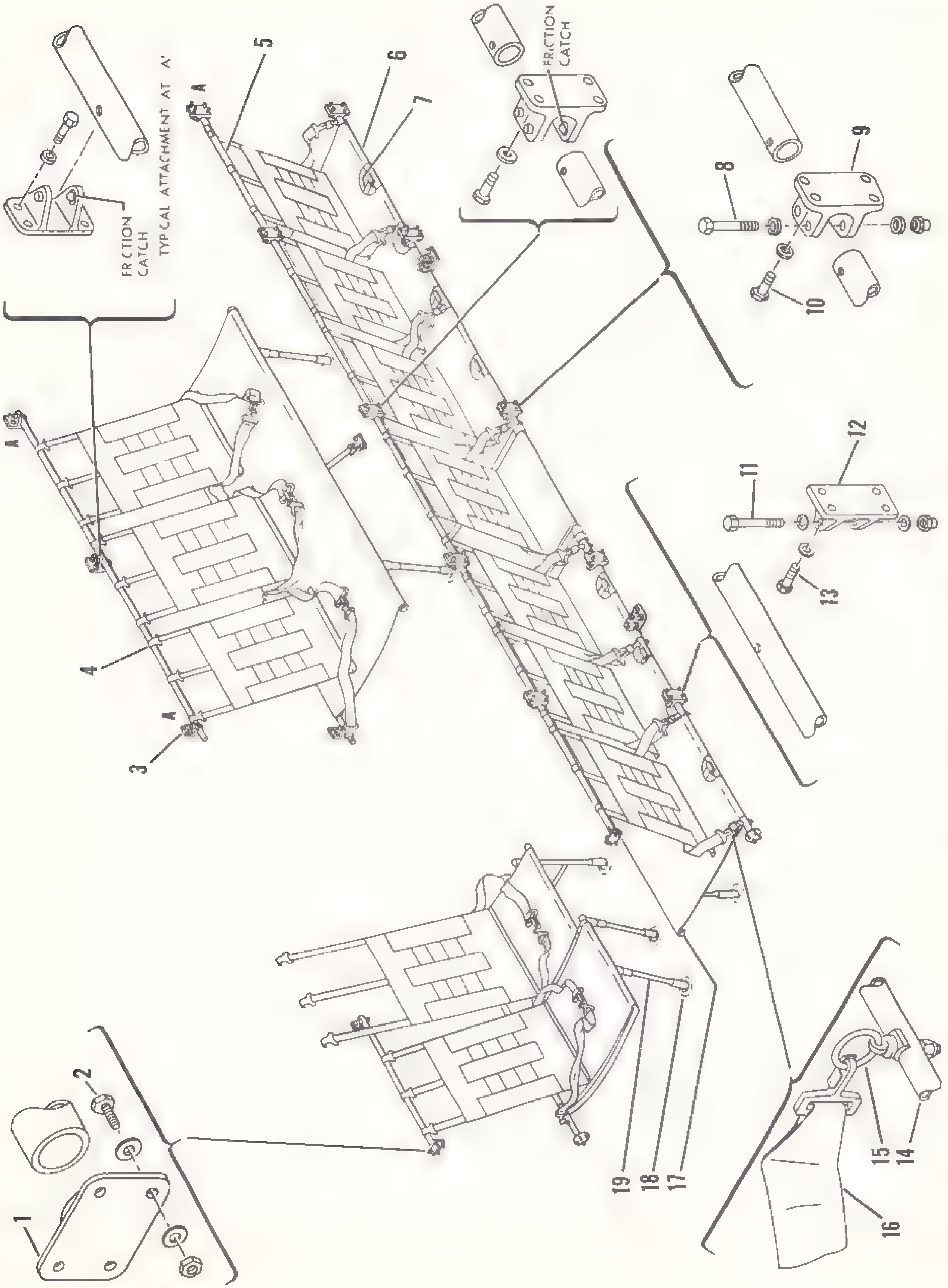


Figure 4–11. Twelve-place troop seat installation (Sheet 2 of 2)

a. Folding and rolling. (1) Press in ears on lower end of each support leg (19, figure 4—11) and remove each support leg from its tiedown fitting (18).

(2) Fold each support leg (19) parallel to seat front support tube (17) of each troop seat.

(3) Lift each troop seat up against cabin wall and fasten straps, located under troop seat, to seat back support tube (5) of each troop seat. (See figure 4—12.)

Note

For permanent stowage, roll troop seats as outlined in steps (4) through (6).

(4) Release straps from seat back support tubes (5, figure 4—11) and free spreaders (7) from fittings on cabin floor. Fold spreaders parallel with support legs (19).

(5) Unhook back strap hooks (4) from seat back support tubes (5).

(6) Roll up each troop seat and secure roll with straps to seat rear support tubes (6 and 14).

b. Unrolling and unfolding. (1) Unfasten straps securing each troop seat to seat rear support tubes (6 and 14, figure 4—11) and unroll each troop seat.

(2) Unfold spreaders (7) and position each spreader on seat rear support tubes (6 and 14).

(3) Unfold support legs (19) and press each support leg into its tiedown fitting (18).

(4) Hook each back strap hook (4) onto seat back support tubes (5).

c. Removal. (1) Press in ears on lower end of each support leg (19, figure 4—11) and remove each support leg from its tiedown fitting (18).

(2) Remove pins and remove ends of spreaders (7) from fittings on cabin floor. Fold spreaders and support legs (19) parallel to seat front support tubes (17).

(3) Unsnap each safety belt (16) from each eyebolt ring (15) and remove safety belts.

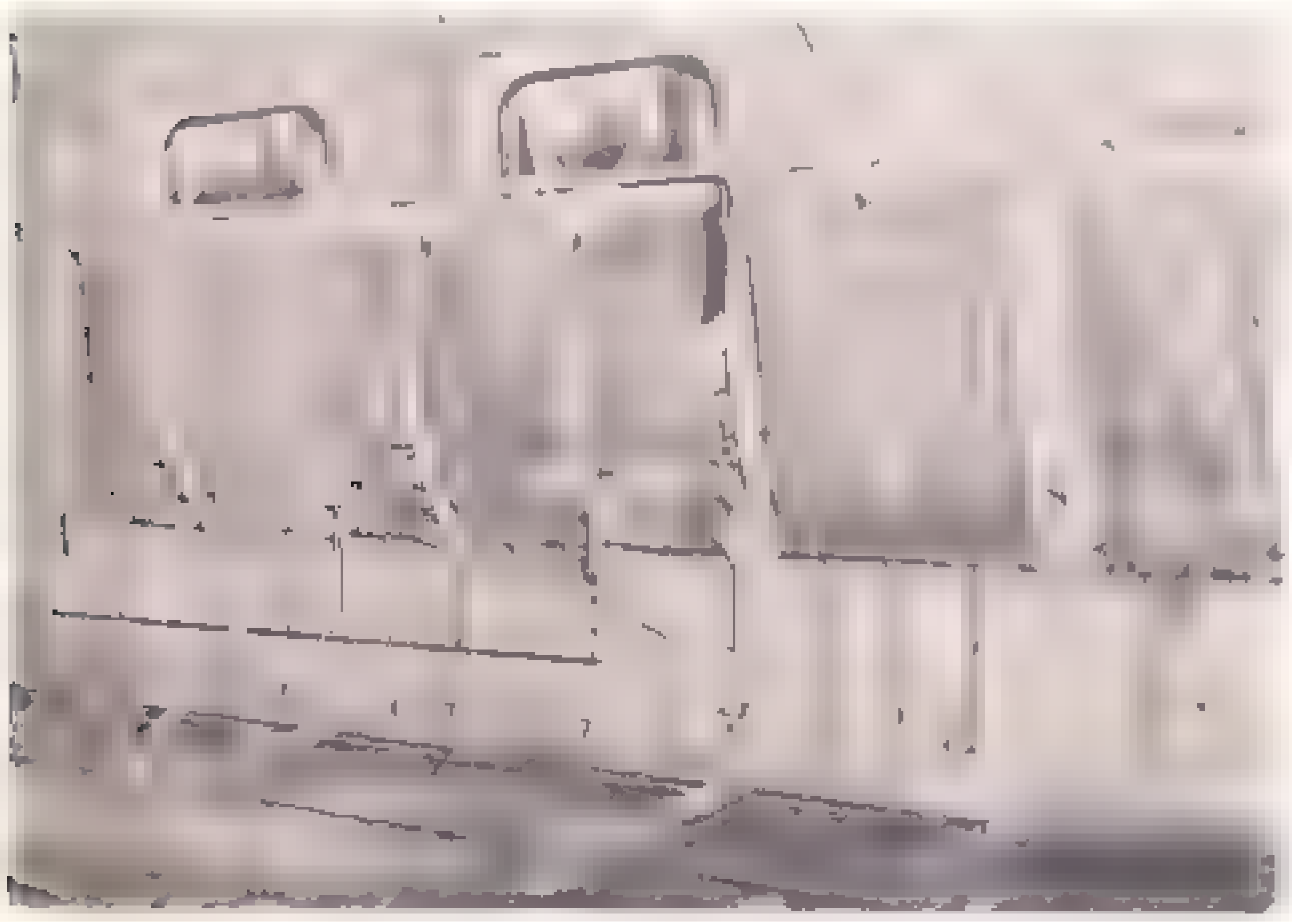


Figure 4—12. Twelve-place troop seats (folded position)

(4) Remove bolts, washers, and nuts (8 and 11) securing seat rear support tubes (6 and 14) in support fittings (9 and 12).

(5) Unhook back strap hooks (4) from seat back support tubes (5) and seat rear support tubes (6 and 14) from support fittings (9 and 12). Remove troop seats from cabin.

(6) Remove seat back support tubes (5) from support fittings (3) on cabin walls.

(7) Remove bolts and washers securing support fittings (3) to cabin walls and remove support fittings.

Note

The litter installation may be installed without removing any other support fittings. Some supports for the litter installation fit in the same places as the support fittings (3).

(8) Remove bolts, washers, and nuts (2) securing support fittings (1) on bulkheads and remove support fittings.

(9) Remove bolts and washers (10 and 13) securing support fittings (9 and 12) on cabin walls and remove support fittings.

d. Cleaning. (1) Clean nylon webbing of 12-place troop seats and safety belts in accordance with TM 55-405-3.

(2) Clean support tubes and support fitting with solvent (item 4, table 1—8).

e. Inspection. (1) Inspect nylon webbing of 12-place troop seats and safety belts for cuts, tears, fraying, deterioration, and cleanliness.

(2) Inspect support tubes and support fittings for cracks, dents, bends, and elongated mounting holes.

f. Installation. (1) Position support fittings (9 and 12, figure 4—11) on cabin wall and secure with bolts and washers (10 and 13).

(2) Position support fittings (1) on bulkheads and secure with bolts, washers, and nuts (2).

(3) Position support fittings (3) on cabin wall and secure with bolts and washers.

(4) Install seat back support tubes (5) in support fittings (3).

(5) Position each troop seat in its proper position in cabin and install seat rear support tubes (6 and 14) in support fittings (9 and 12). Secure seat rear support tubes in support fittings with bolts, washers, and nuts (8 and 11).

(6) Unfold spreaders (7) and support legs (19) and secure spreaders to fittings on cabin floor. Press end of each support leg into its tiedown fitting (18).

(7) Hook back strap hooks (4) on seat back support tubes (5).

(8) Connect ends of each safety belt (16) to eyebolt rings (15) at each place on each troop seat.

4—45. Eighteen-Place Troop Seats. The 18-place troop seats (figure 4—13) are installed in the cabin of helicopters serial No. 56-4313 and subsequent. The 18-place troop seats consist of one 9-place troop seat (17), installed against the left cabin wall; one 4-1/2 place troop seat (48) and one 1-1/2 troop seat (28), installed against the right cabin wall; and one 3-place seat step (41), mounted on the cabin floor at the cargo door. The 3-place troop seat can be folded out through the cargo door for use as a step. (See figure 4—14.) Hooks installed at the top of each seat back secure the seat backs to the upper support tubes (4, 13, 18, and 22, figure 4—13) high on the cabin walls. Safety belts (6) are provided for each place on each troop seat and are attached to eyebolt rings on each lower support tube for each troop seat.

Note

An instruction plate, mounted over the cargo door gives the necessary instructions for the proper operation of the seat step.

a. Folding. (1) Remove pins securing diagonal supports (23, figure 4—13) for troop seats (17 and 48) to fitting on cabin floor.

(2) Press ears on lower end of each seat leg (29) and remove each seat leg from its tiedown fitting on cabin floor.

(3) Fold each troop seat (17, 28, and 48) up against cabin wall and secure each troop seat in this position with straps (25).

(4) Fold seat legs (29) and diagonal supports (23) against bottom of troop seats (17, 28, and 48).

b. Unfolding. (1) Unfold seat legs (29, figure 4—13) and diagonal supports (23) from bottom of troop seats (17, 28, and 48).

(2) Unfasten straps (25) securing troop seats (17, 28, and 48) against cabin wall and fold troop seats down.

(3) Push lower ends of seat legs (29) into proper tiedown fittings and pull up on troop seats (17, 28, and 48) to insure seat legs are securely in place.

(4) Position lower ends of diagonal supports (23) to fittings on cabin floor and secure with pins.

c. Removal. (1) Remove safety belt (6, figure 4—13) from each place of each troop seat by unhooking ends of each safety belt from eyebolt rings on lower support tubes.

(2) Remove troop seat (28) as follows:

(a) Unhook seat back from upper support tube (22).

(b) Press in on ears of each seat leg (29) and remove seat legs from tiedown fittings. Allow troop seat (28) to rest on seat legs.

(c) Remove pin (34) securing lower support tube (31) in support fitting (39).

(d) Remove bolt, washers, and nut (32) securing lower support tube (31) in support fitting (33).

(e) Pull troop seat (28) aft until lower support tube (31) is free of support fitting (30).

(f) Lift troop seat (28) and fold seat legs (29) against bottom of troop seat. Remove lower support tube (31) from support fittings (33 and 39) and remove troop seat from cabin.

(g) Remove bolt, washers, and nut (21) securing upper support tube (22) in support fitting (20). Move upper support tube aft until it clears support fitting (24) and remove upper support tube from support fitting (20).

(h) Remove bolts, washers, and nuts and remove support fittings (20, 24, 30, 33, and 39), if required.

(3) Remove troop seat (48) as follows:

(a) Unhook each seat back from upper support tube (18).

(b) Remove pin securing diagonal support (23) to tiedown fitting on cabin floor.

(c) Press in on ears of each seat leg (29) and remove seat legs from tiedown fittings. Allow troop seat (48) to rest on seat legs.

(d) Remove pins (46, 51, and 53) securing lower support tube (49) in support fittings (47 and 52).

(e) Remove bolt, washer, and nut securing support fitting (50) on lower support tube (49).

(f) Pull lower support tube (49) forward until it clears support fitting (52) and remove lower support tube from support fittings (47 and 50).

(g) Fold seat legs (29) and diagonal supports (23) against bottom of troop seat (48) and remove troop seat from cabin.

(h) Move upper support tube (18) forward until it clears support fitting (54) and remove upper support tube from support fittings (19).

(i) Remove bolts and washers securing support fittings (19) on cabin wall if litter installation is to be installed and remove support fittings. Remove bolts, washers, and nuts and remove any other support fittings (47, 50, 52, and 54) required to be removed.

(4) Remove troop seat (17) as follows:

(a) Remove hooks on upper ends of each seat back from upper support tubes (4 and 13).

(b) Remove pins securing diagonal supports (23) to tiedown fittings on cabin floor.

(c) Press in on ears of each seat leg (29) and remove seat legs from tiedown fittings. Allow troop seat (17) to rest on seat legs.

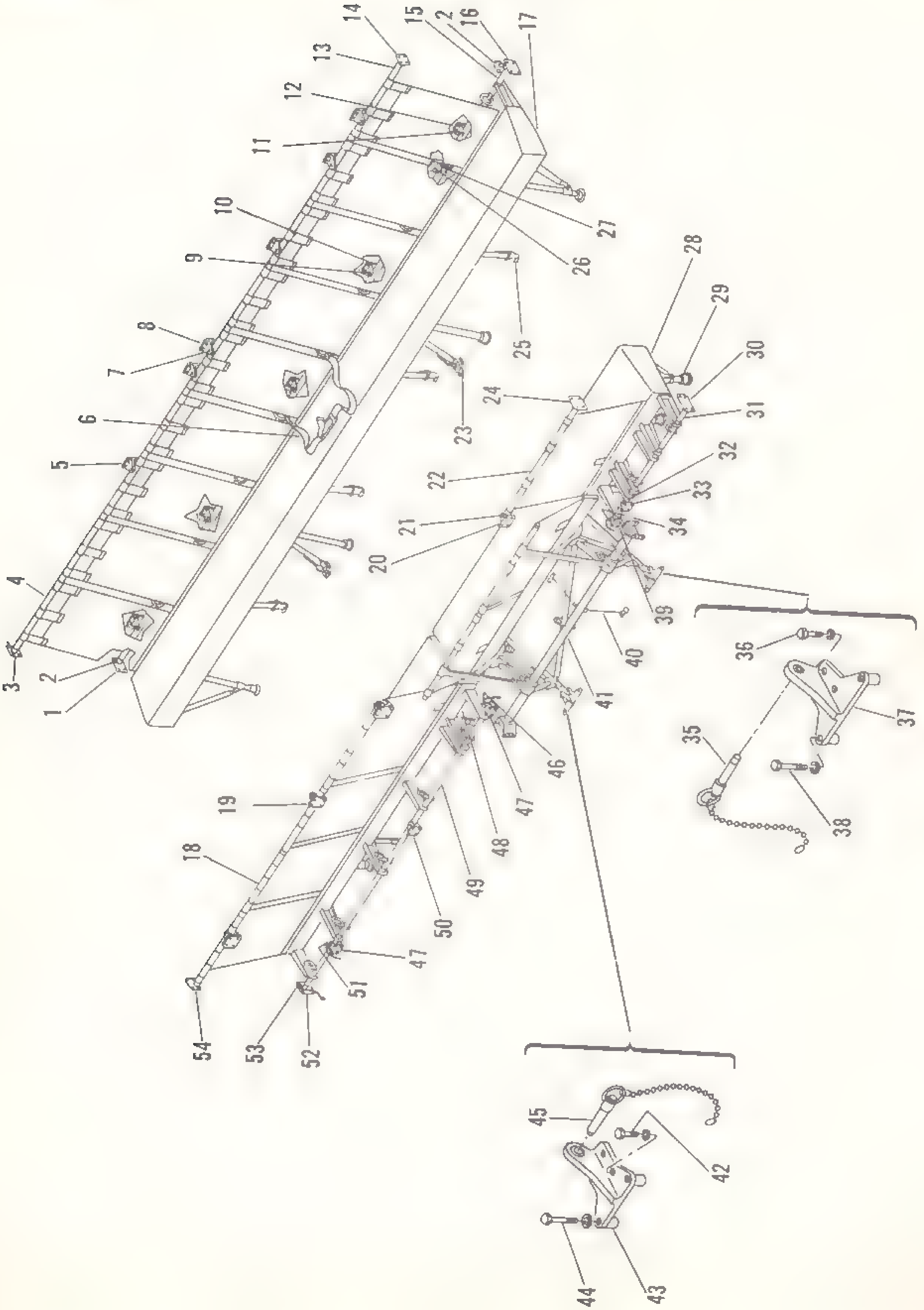


Figure 4–13. Eighteen-place troop seat installation (Sheet 1 of 2)

1. Support Fitting
2. Pin
3. Support Fitting
4. Upper Support Tube
5. Support Fitting
6. Safety Belt
7. Bolt, Washer, Nut
8. Support Fitting
9. Pin
10. Support Fitting
11. Bolt, Washer, Nut
12. Support Fitting
13. Upper Support Tube
14. Support Fitting
15. Lower Support Tube
16. Support Fitting
17. Troop Seat
18. Upper Support Tube
19. Support Fitting
20. Support Fitting
21. Bolt, Washer, Nut
22. Upper Support Tube
23. Diagonal Support
24. Support Fitting
25. Straps
26. Bolt, Washer, Nut
27. Support Fitting
28. Troop Seat
29. Seat Leg
30. Support Fitting
31. Lower Support Tube
32. Bolt, Washers, Nut
33. Support Fitting
34. Pin
35. Pin
36. Bolt, Washer
37. Hinge Fitting
38. Bolt, Washer
39. Support Fitting
40. Release Cable
41. Seat Step
42. Bolt, Washer
43. Spacer
44. Bolt, Washer
45. Pin
46. Pin
47. Support Fitting
48. Troop Seat
49. Lower Support Tube
50. Support Fitting
51. Pin
52. Support Fitting
53. Pin
54. Support Fitting

Figure 4–13. Eighteen-place troop seat installation (Sheet 2 of 2)

Figure 4–14. Seat step in down (step) position

(d) Remove pins (2 and 9) securing lower support tube (15) to support fittings (1, 10, and 16).

(e) Remove bolts, washers, and nuts (11 and 26) securing lower support tube (15) in support fittings (12 and 27).

(f) Pull troop seat (17) inboard until lower support tube (15) clears support fittings. Fold seat legs (29) and diagonal supports against bottom of troop seat. Remove troop seat from cabin.

Note

It may be necessary to carry the troop seat (17) part of the way into the electronics compartment, then turn the troop seat so it can be moved out of the cargo door, between the shock strut and the fuselage.

(g) Remove upper support tube (4) by pulling it free from support fittings (3 and 5).

(h) Remove bolts, washers, and nuts (7) securing upper support tube (13) in support fitting (8). Pull upper support tube aft until it clears support fitting (14) and remove upper support tube from support fittings (8).

(i) Remove bolts and washers and remove support fittings (5 and 8) if litter installation is to be installed. Remove bolts, washers, and nuts and remove support fittings (1, 3, 14, 16, and 27), if required.

(5) Remove seat step (41) as follows:

(a) Open cargo door and pull release cable (40) and release seat step from cabin floor. Move seat step to the down (step) position.

(b) Remove bolt securing lug of release cable (40) to cabin floor and reinstall bolt.

(c) Pull release cable (40) to release lockpins from fittings of cargo sling. Raise seat step (41) slightly to prevent reengagement of lockpins. Support seat step in this position.

(d) Remove pins (35 and 45) securing seat step (41) to hinge fittings (37) and remove seat step.

(e) Remove lock wire from four outboard bolts (38 and 44) and remove bolts and washers (36, 38, 42 and 44) securing hinge fittings (37) to cargo door sill. Remove hinge fittings and spacers (43).

(f) Remove screws securing lock fittings to cargo door frame and remove lock fittings.

d. Cleaning. (1) Clean nylon seat cushions, seat backs, and safety belts in accordance with TM 55-405-3.

(2) Clean all metal components of troop seats with solvent (item 4, table 1–8) and dry with filtered compressed air.

e. Inspection. (1) Inspect nylon seat cushions, seat backs, and safety belts for cuts, tears, fraying, and cleanliness.

(2) Inspect all metal components of troop seats for cracks, dents, bends, and elongated mounting holes.

f. Installation. (1) Install seat step (41, figure 4—13) as follows:

(a) Position lock fittings on cargo door frame and secure with screws.

(b) Position hinge fittings (37) and spacers (43) on cargo door sill and secure with bolts and washers (36, 38, 42, and 44). Secure the four outboard bolts (38 and 44) with lock wire.

(c) Position seat step (41) on hinge fittings (37) and install pins (35 and 45).

(d) Remove bolt from cabin floor and position lug of release cable (40) on cabin floor. Secure lug with bolt.

(e) Operate seat step (41) in accordance with instruction plate mounted over cargo door and check seat step for proper operation.

(2) Install troop seat (17) as follows:

(a) Position support fittings (1, 3, 14, and 16), if removed, on bulkheads and secure with bolts, washers, and nuts.

(b) Position support fittings (5, 8, and 27) on cabin wall and secure with bolts, washers, and nuts.

(c) Position upper support tube (13) in support fittings (8 and 14) and install bolts, washers, and nuts (7) in support fitting (8).

(d) Position upper support tube (4) in support fittings (3 and 5).

(e) Move troop seat (17) into cabin and position lower support tube (15) in support fittings (1, 10, 12, 16, and 27). Install pins (2 and 9) in support fittings (1, 10, and 16) and bolts, washers, and nuts (11 and 26) in support fitting (12 and 27).

Note

To get troop seat (17) into cabin, it may be necessary to pass the troop seat between the shock strut and the fuselage through the cargo door and part of the way into the electronics compartment, then into position in the cabin.

(f) Unfold diagonal supports (23) and seat legs (29). Allow troop seat (17) to rest on seat legs.

(g) Install each seat leg (29) into its tiedown fitting and secure diagonal supports (23) to fittings on cabin floor with pins.

(h) Hook upper end of each seat back on support tubes (4 and 13).

(3) Install troop seat (48) as follows:

(a) Position support fittings (19) on cabin wall and secure with bolts and washers. Position support fittings (47, 50, 52, and 54), if removed, on cabin wall and bulkhead and secure with bolts, washers, and nuts.

(b) Position upper support tube (18) in support fittings (19 and 54).

(c) Move troop seat (48) into cabin and position lower support tube (49) into support fittings (47, 50, and 52). Install pins (46, 51, and 53) in support fittings (47 and 52).

(d) Unfold seat legs (29) and diagonal support (23). Allow troop seat (48) to rest on seat legs.

(e) Install each seat leg (29) into its tiedown fitting and secure diagonal support (23) to fittings on cabin floor with pin.

(f) Hook upper end of each seat back on upper support tube (18).

(4) Install troop seat (28) as follows:

(a) Position support fittings (20, 24, 30, 33, and 39), if removed, on cabin wall and bulkhead and secure with bolts, washers, and nuts.

(b) Position upper support tube (22) in support fittings (20 and 24). Secure upper support tube in support fitting (20) with bolt, washers, and nut (21).

(c) Move troop seat (28) into cabin and position lower support tube (31) in support fittings (30, 33, and 39).

(d) Install pin (34) in support fitting (39) and bolt, washers, and nut (32) in support fitting (33), securing lower support tube (31) in position.

(e) Unfold seat legs (28) and install each seat leg into its tiedown fitting.

(f) Hook seat back onto upper support tube (22).

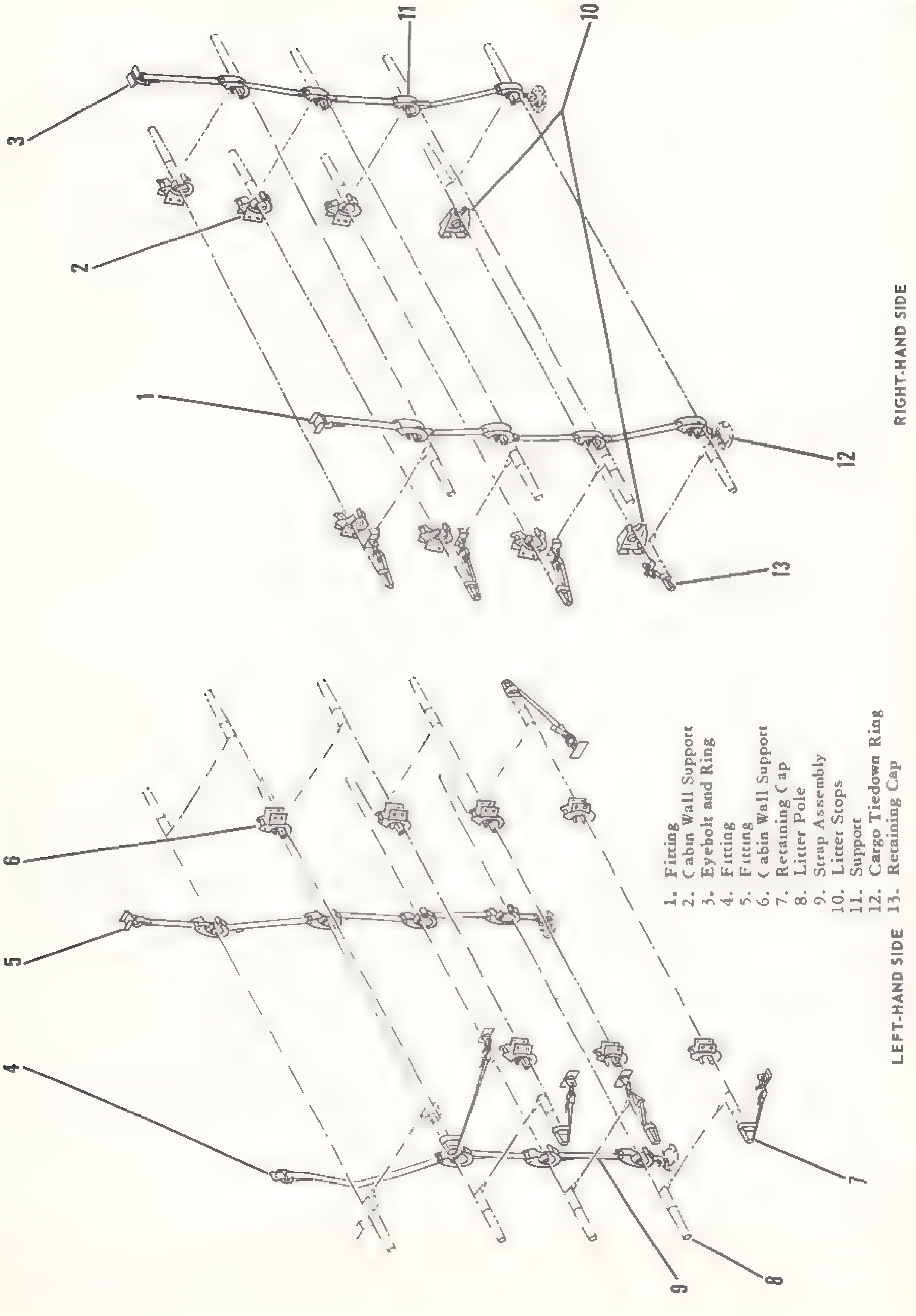
(5) Install a safety belt (6) at each place on each troop seat by hooking ends to eyebolt rings on lower support tubes.

4—46. Litter Installation. Provisions are made for a litter installation (figure 4—15) in the cabin, four litters against each cabin wall. The litter installation consists primarily of eight litters, ceiling fittings (1, 3, 4, and 5), cabin wall supports (2 and 6), retaining caps (7 and 13), strap assemblies (9), litter stops (10), and strap supports (11).

a. Removal. (1) Release straps of retaining caps (7 and 13, figure 4—15) and remove retaining caps from forward end of outboard pole of each litter and aft end of outboard pole on left bottom litter.

(2) Loosen cabin wall supports (2 and 6) and strap assemblies (9) and remove litters.

(3) Open slides and remove strap assemblies (9) from ceiling fittings (1, 3, 4, and 5). Remove lower end of each strap assembly from cargo tiedown rings (12) and remove strap assemblies.



1. Fitting
2. Cabin Wall Support
3. Eyebolt and Ring
4. Fitting
5. Fitting
6. Cabin Wall Support
7. Retaining Cap
8. Litter Pole
9. Strap Assembly
10. Litter Stops
11. Support
12. Cargo Tiedown Ring
13. Retaining Cap

Figure 4–15. Litter installation

(4) Slide cabin wall supports (2), which secure second highest litter, out of channels on cabin walls. Remove bolts, washers, and nuts and remove channels from cabin walls.

Note

At this time, troop seat installation may be installed without removing any more of the litter installation.

(5) Remove nuts and washers securing retaining caps (7 and 13) and remove retaining caps.

(6) Remove bolts, washers, and nuts securing litter stops (10) to cabin walls and remove litter stops.

(7) Remove bolts, washers, and nuts securing ceiling fittings (1, 3, 4, and 5) on cabin ceiling and remove ceiling fittings.

(8) Slide cabin wall supports (6) out of channels on cabin walls. Remove bolts, washers, and nuts and remove channels from cabin wall.

b. Cleaning. (1) Clean litter canvas and strap assemblies in accordance with TM 55-405-3.

(2) Clean all metal components of litter installation with solvent (item 4, table 1–8).

c. Inspection. (1) Inspect litter canvas and strap assemblies for cuts, tears, holes, fraying, and broken stitches.

(2) Inspect all metal components of litter installation for cracks, dents, and bends.

d. Installation. (1) Position ceiling fittings (1, 3, 4, and 5, figure 4–15) on cabin ceiling and secure with bolts, washers, and nuts.

(2) Position channels for cabin wall supports (2 and 6) on cabin walls and secure with bolts, washers, and nuts. Slide cabin wall supports onto channels.

(3) Position litter stops (10) on cabin walls and secure with bolts, washers, and nuts.

(4) Position ends of retaining caps (7 and 13) into fittings and secure with washers and nuts.

(5) Hook lower ends of strap assemblies (9) to cargo tiedown rings (12) and fasten upper ends to ceiling fittings (1, 3, 4, and 5).

(6) Position litters in cabin wall supports (2 and 6), litter stops (10), and strap supports (11). Tighten strap assemblies (9).

(7) Install retaining caps (7 and 13) on forward outboard pole of each litter and aft outboard pole of right bottom litter. Tighten straps of retaining caps.

4–47. *Personnel Barrier.* A personnel barrier (22, figure 4–8) is installed in the opening in the cabin rear bulkhead to prevent personnel from entering the electronics compartment. The personnel barrier consists primarily of a webbed strap assembly suspended from a tube. The tube is secured at the top of the opening by an electrically operated solenoid. The solenoid is mounted on the bulkhead. The strap assembly contains six horizontal and four vertical straps. A channel nut on each end of each horizontal strap slides in a channel secured to the bulkhead. The lower end of each outboard vertical strap is secured to the bulkhead. When not in use, the personnel barrier is folded down against the cabin floor. The personnel barrier is placed in position by pulling it up to the top of the opening and engaging the plate located on the tube with the solenoid. The plate is released from the solenoid by operating the switch marked ELEC COMPT BARRIER REL located on the overhead control panel in the pilots' compartment.

a. Operational check. (1) Operate ELEC COMPT BARRIER REL switch located on overhead control panel in pilots' compartment.

(2) Check that personnel barrier plate is released from solenoid and personnel barrier is free to slide down channels.

b. Removal. (1) Remove screws, washers, and nuts from lower end of each outboard vertical strap which secures straps to bottom of bulkhead.

(2) Release plate from solenoid, and work channel nuts at top of vertical straps up and out of channels and remove personnel barrier.

c. Inspection. Inspect personnel barrier in accordance with TM 55-405-3.

d. Installation. (1) Slide channel nut into channels at both sides of vertical straps.

(2) Engage plate at solenoid release.

(3) Secure vertical straps at bottom of bulkhead with screws, washers, and nuts.

4–48. *First Aid Kit.* One first aid kit (24, figure 4–8) is located on the forward left side of the cabin rear bulkhead above the electronics compartment opening. Mounting provisions have been provided for installing a second first aid kit on the forward right side of the cabin rear bulkhead above the electronics compartment opening. The first aid kit is removed by unsnapping its fasteners.

4–49. *Canteen Installation.* Provisions are provided for the installation of a canteen, forward of the cargo door on the right side of the cabin.

4–50. *Stowage Bag.* A stowage bag is located on the aft left side of the cabin and is used for stowing the following equipment when not in use; litter supports, troop seat support fittings, blackout curtains, and engine preheat ducts.

4–51. *Cargo Tiedown Belts.* Ten adjustable cargo tiedown belts (26, figure 4–8) are provided for each helicopter. The cargo tiedown belts fasten to the cargo tiedown fittings in the cabin floor and are readily removed

by releasing the ring fasteners. When not in use the cargo tiedown belts are stowed on the aft left side of the cabin at floor level.

4–52. Relief Tubes. Two relief tubes (3, figure 4–8), accessible to personnel in both the cabin and pilots' compartment, are located on the cabin forward bulkhead and to the left of the pilot's ladder. The relief tube horns are supported by brackets on each side of the main drive shaft tunnel, aft of the console. The relief tubes connect to the overboard tube assembly, at a tee-fitting, at floor level. The tube assembly passes at floor level forward through the bulkhead, down through the bottom structure, and out of the helicopter to a venturi secured to the underside of the fuselage.

a. Removal. (1) Lift horns from brackets and remove insulation tape from relief tubes. Disconnect horns from tubes.

(2) Remove insulation tape from relief tubes. Disconnect tubes from tee-fitting and remove from guides.

(3) Remove insulation tape from overboard tube assembly. Disconnect tee-fitting from tube assembly.

(4) Remove screws, washers, and nuts securing venturi to fuselage. Remove insulation tape from tube assembly. Disconnect venturi from tube assembly.

(5) Remove grommets from cabin floor assembly and bottom structure plating. Pull tube assembly through cabin forward bulkhead and out bottom structure.

b. Cleaning. Clean relief tubes in accordance with paragraph 1–68.

c. Inspection. (1) Inspect horn of each relief tube for cracks and dents.

(2) Inspect tube assemblies for fraying and deterioration.

d. Installation. (1) Insert end of overboard tube assembly through cabin forward bulkhead and out bottom structure. Install grommets in cabin floor assembly and bottom structure plating.

(2) Connect venturi to tube assembly and secure with insulation tape (item 42, table 1–8). Coat taped area with shellac (item 43, table 1–8). Position venturi on fuselage and secure with screws, washers, and nuts.

(3) Connect tee-fitting to overboard tube assembly and secure with insulation tape. Coat taped area with shellac.

(4) Connect relief tubes to tee fitting and secure with insulation tape. Coat taped areas with shellac. Position relief tubes in guides.

(5) Connect horns to relief tubes and secure with insulation tape. Coat taped areas with shellac. Position horns in brackets.

Note

Install tubing so as to eliminate any residue pockets.

4–53. Electronics Compartment. The electronics compartment (8, figure 1–6) is located just aft of the rear bulkhead in the cabin. Shelves are provided in the electronics compartment for mounting the electrical and radio equipment. Access to the electronics compartment is gained through the opening in the rear bulkhead of the cabin. An opening is provided in the electronics compartment rear bulkhead to provide access to the heater compartment. The aft section of the tail rotor drive shaft cover encloses the portion of the drive shaft located in the electronics compartment.

4–54. Heater Compartment. The heater compartment (9, figure 1–6), which houses the cabin heater, is located just aft of the electronics compartment. Tail rotor flight control components are mounted in the heater compartment. The rubber coupling for the tail rotor drive shaft, which connects the third and fourth sections of the drive shaft, is located just aft of the electronics compartment rear bulkhead. The aft fuselage section (tail cone) is attached to the aft end of the heater compartment and is accessible only through the heater compartment.

4–55. Heater Compartment Catwalk. The heater compartment catwalk is installed on the bottom structure in the heater compartment, between the bulkhead of the electronics compartment and rear bulkhead of the heater compartment.

a. Removal. Remove screws and washers securing heater compartment catwalk on bottom structure and bulkheads in heater compartment. Remove catwalk.

b. Cleaning. Clean heater compartment catwalk in accordance with paragraph 1–62.

c. Inspection. Inspect heater compartment catwalk for cracks, dents, bends, holes, and corrosion.

d. Installation. Position heater compartment catwalk in heater compartment. Secure catwalk in position on bottom structure and bulkheads with screws and washers.

4–56. Cargo and Personnel Handling Equipment. The cargo and personnel handling equipment consists of the cargo sling installation and rescue hoist system.

4–57. Cargo Sling Installation. The cargo sling installation (figure 4–16) consists of the cargo release hook, sling cables, stowage cable assembly, and cargo release hook controls. On helicopters serial No. prior to 56-4284 the cargo sling installation is designed to carry 4000 pounds; on helicopters serial No. 56-4284 and subsequent it is designed to carry 5000 pounds.

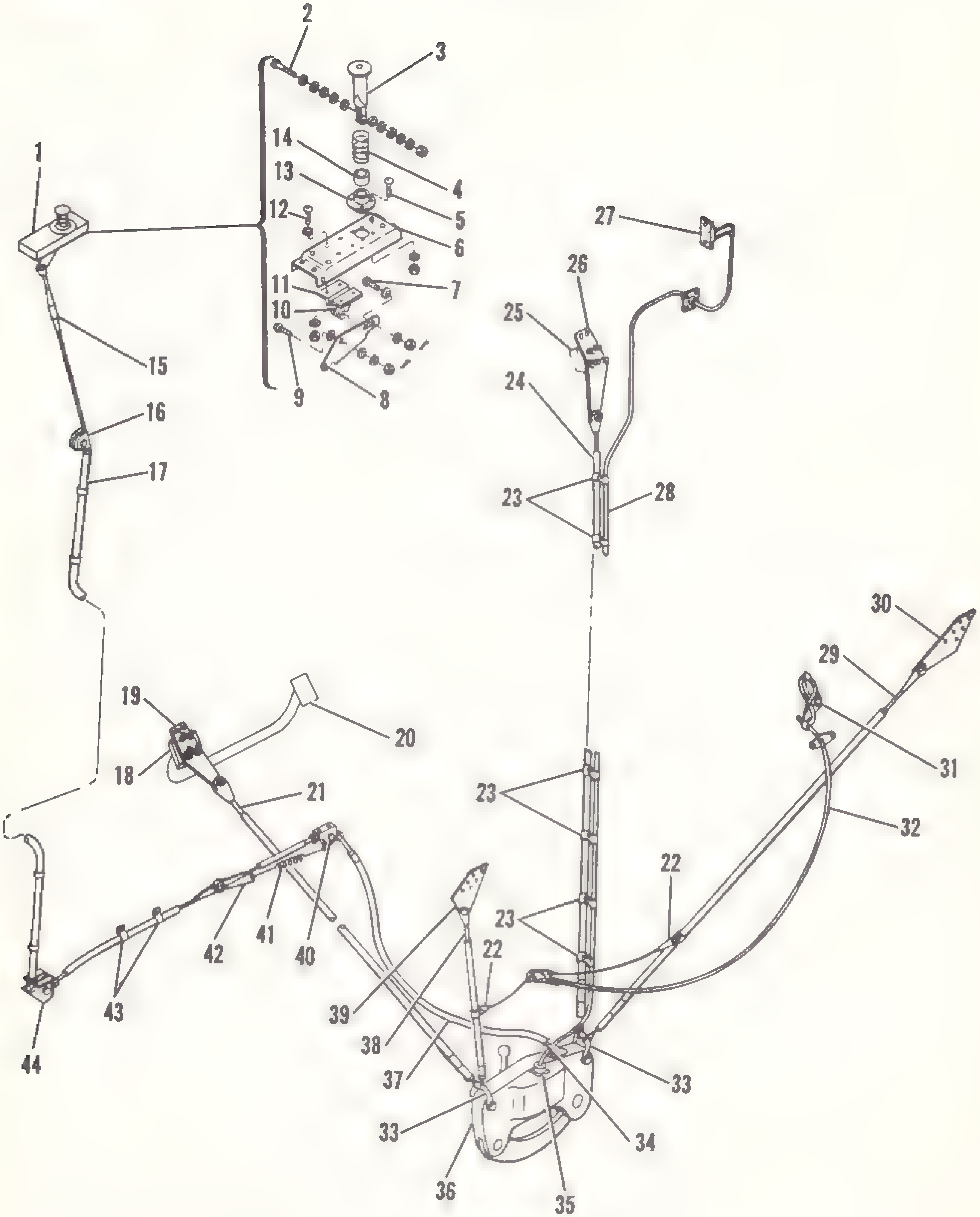
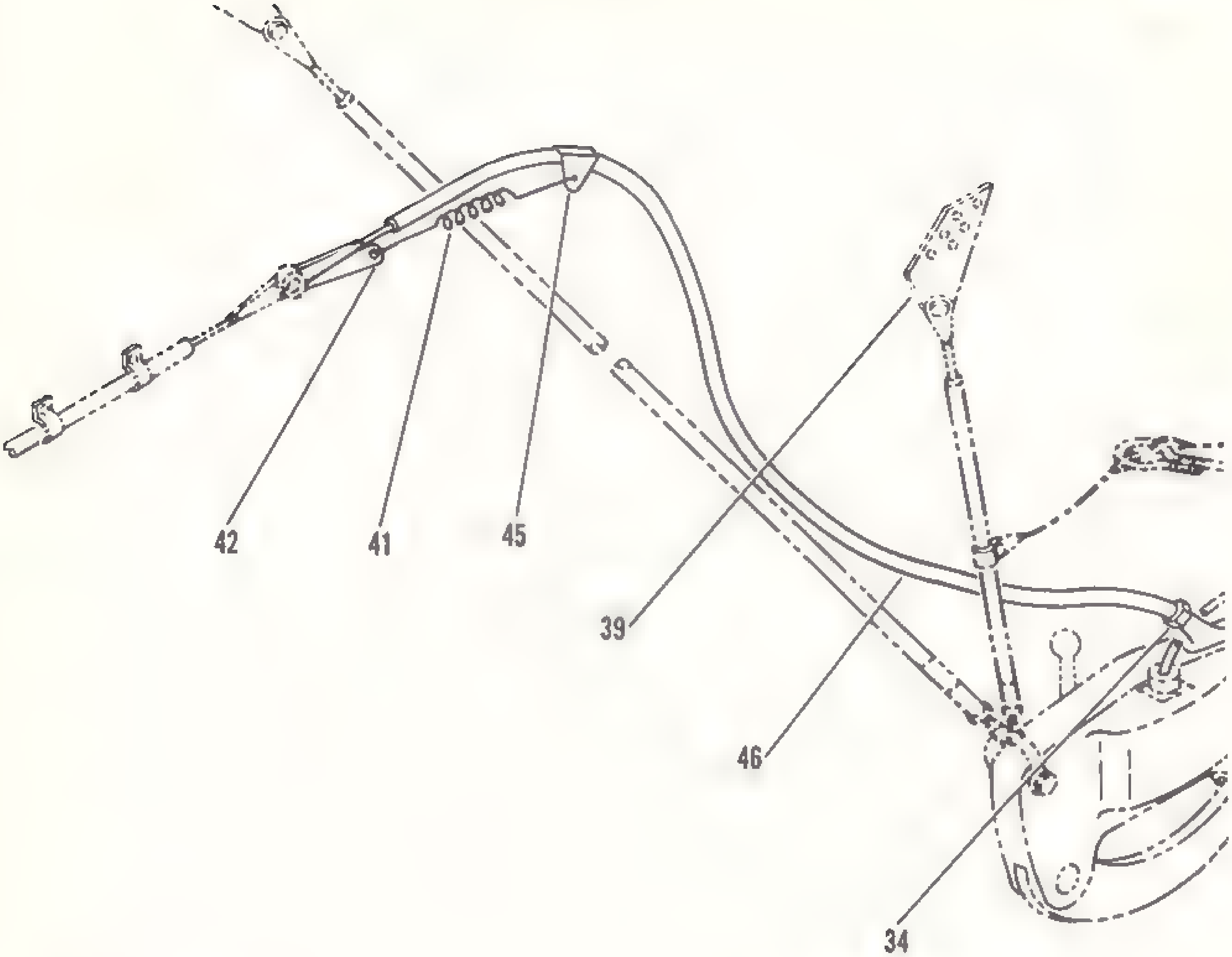


Figure 4–16. Cargo sling installation (Sheet 1 of 2)



1. Actuator Assembly
2. Screw, Washers, Nut
3. Actuator
4. Spring
5. Screw, Washer, Nut
6. Bracket
7. Bolt, Washers, Nut, Cotter Pin
8. Lever
9. Bolt, Washers, Nut, Cotter Pin
10. Bracket
11. Bracket
12. Screw, Washers, Nut
13. Guide Fitting
14. Spacer
15. Turnbuckle
16. Pulley
17. Control Cable Assembly
18. **Lock Fitting
19. Support Plate
20. *Step Assembly
21. Sling Cable
22. Clamp
23. Clamps

*Helicopters serial No. Prior to 56-4313.
**Helicopters serial No. 56-4313 and Subsequent.

24. Sling Cable
25. **Lock Fitting
26. Support Plate
27. Terminal Block
28. Electrical Wiring
29. Sling Cable
30. Support Plate
31. Cable Chock
32. Stowage Cable Assembly
33. Shackle
34. Nut
35. Receptacle
36. Cargo Release Hook
37. † Control Cable Assembly
38. Sling Cable
39. Support Plate
40. †Pulley
41. Spring
42. Plate
43. Clamps
44. Pulley
45. ††Bracket
46. ††Control Cable Assembly

†Helicopters serial No. prior to 56-4284.
††Helicopters serial No. 56-4284 and Subsequent.

Figure 4—16. Cargo sling installation (Sheet 2 of 2)

4–58. *Cargo Release Hook.* The cargo release hook (36, figure 4–16) of either 4000-pound or 5000-pound capacity is used on the cargo sling installation. (Refer to paragraph 4–57.) The particular cargo release hook may be identified by referring to table 4–1. Each cargo release hook contains a load beam that supports the cargo during cargo carrying operations. The load beam is pivoted at one end; the other end of the beam engages a latch when the hook is closed. The latch controls the opening of the hook, which may be accomplished by either manual or electrical controls or automatically. Manual operation is accomplished by either the manual release on the hook or by the actuator of the emergency release control assembly. The manual release on each hook is identified in table 4–1. Both the manual release and the actuator of the emergency release control assembly operate the latch mechanically to release the load beam and allow the hook to open. Electrical operation is accomplished by means of a 24-volt solenoid, located inside the hook, which operates the latch. The solenoid is actuated by the CARGO switch on either the pilot's or copilot's cyclic control stick when the master switch is in the MASTER CARGO SLING or ON position. A normally closed solenoid safety switch inside the hook opens when the hook opens and interrupts the circuit to the solenoid so the solenoid will not be energized longer than necessary. Automatic operation is accomplished by means of the same solenoid as electrical operation, but the solenoid is actuated by a normally open touchdown switch inside the hook when the master switch is in the AUTO position. The touchdown switch is open when a load of 100 to 120 pounds, or greater, is suspended from the load beam. When the load is reduced to less than 100 to 120 pounds through contact with the ground, the touchdown switch is closed and the solenoid is actuated. The switch is closed by the upward motion of a spring-loaded trigger in the load beam of the 4000-pound hook and by the upward motion of the spring-loaded pivot end of the load beam of the 5000-pound hook. The solenoid safety switch operates during automatic release as it does during electrical release. The master switch should be placed in the SAFE position during flight to prevent accidental opening of the hook caused by wind gusts or maneuvers that might momentarily unload the load beam or by accidental closing of one of the CARGO switches.

Caution

The master switch should not be placed in the AUTO position when a load of less than 200 pounds is suspended from the cargo release hook. Under no circumstances should the master switch be placed in the AUTO position when a load of less than 120 pounds is suspended from the cargo release hook.

Caution

The cargo sling installation should be stowed at all times, except when actually in use.

a. Operational check. An operational check may be performed on the cargo release hook (36, figure 4–16) either from a hovering helicopter or from a fabricated test stand. If a test stand is used, it must simulate as nearly as possible the actual operation of the cargo release hook with both its electrical and manual controls. A wiring system similar to that used in the helicopter must be installed to permit operation of the electrical portion of the cargo release hook.

(1) Suspend a load from cargo release hook (36) that is equal to rated capacity of cargo release hook being checked.

(2) Place master switch in MASTER CARGO SLING or ON position.

(3) Actuate CARGO switch on cyclic control stick. Cargo release hook should release load.

(4) Suspend load again and place master switch in AUTO position. Cargo release hook should not release load until load contacts ground.

(5) Suspend load again and place master switch in SAFE position. Cargo release hook should not release load when CARGO switch on cyclic control stick is actuated or when load contacts ground.

(6) Suspend load again and check to insure that cargo release hook releases load when actuator (3) of emergency release control assembly is pressed and again when manual release on cargo release hook is actuated.

b. Removal. (1) Place BATT and GEN switches in OFF position and be sure any external power source is disconnected.

(2) Disconnect receptacle (35, figure 4–16) of electrical wiring from top of cargo release hook (36).

(3) Open or remove cable attaching access door on side or rear of cargo release hook (36) by removing screws and washers.

(4) Remove cotter pin and remove cable from forked end of release lever located adjacent to latch arm inside access hole on 4000-pound cargo release hook. On 5000-pound cargo release hook, pull end of cable out through access opening, move end of latch and lever to upper part of door opening, curve cable slightly, and slip it out of inclined slot in latch and lever.

Note

On cargo release hook, part No. S1650-62167-3 only, a cotter pin also secures terminal on end of short manual release cable.

(5) Back off nut (34) of control cable assembly (37 or 46) from adapter at top of cargo release hook (36).

Table 4—1. Cargo release hook identification

SIKORSKY PART NO.	MANUFACTURER	CAPACITY	EFFECTIVITY	IDENTIFICATION
S1650-62167	Manning, Maxwell & Moore, Muskegon, Mich.	*4000 Pounds	Helicopters serial No. 53-4475 through 55-4504	Nylon microswitch follow-up pins. Lug on load beam to prevent load from shifting. Manual release on bottom rear. Solenoid mounted internally.
S1650-62167-1	Manning, Maxwell & Moore	*4000 Pounds		7/32-inch steel pin added through load beam and trigger. Lug on load beam to prevent load from shifting. Manual release on bottom rear. Nylon microswitch follow-up pins. Solenoid mounted internally.
S1650-62167-2	Manning, Maxwell & Moore	*4000 Pounds		Steel microswitch follow-up pins replace nylon follow-up pins. Radius plates installed. Improved forged load beam with straight vertical inner edge. Lug removed from load beam. Manual release on bottom rear. Solenoid mounted internally.
S1650-62167-3	Manning, Maxwell & Moore	*4000 Pounds		Manual release cable at top left of hook. Lug removed from load beam. Improved forged load beam with straight vertical inner edge. Solenoid mounted internally.
S1650-62194	Eastern Rotorcraft Corp, Doylestown, Pa	*5000 Pounds	Helicopters serial No. 56-4284 and subsequent	Manual release arm on forward end of left side. Solenoid is mounted beneath cover on right side of hook.
S1650-62194-1	Eastern Rotorcraft Corp	*4000 Pounds		The part No. S1650-62194-1 cargo release hook is installed as part of the part No. S1607-2412 Cargo Sling Release Hook Replacement Kit and replaces a part No. S1650-62167, -1, -2, or -3 cargo release hook. Although the part No. S1650-62194-1 cargo release hook is a modified Eastern Rotorcraft Corporation SP4070 hook (5000-pound capacity), it has been downrated to 4000-pound capacity for this installation.

*All 4000-pound hooks are interchangeable with each other; 4000-pound capacity hooks are not interchangeable with 5000-pound capacity hook nor is 5000-pound capacity hook interchangeable with any of 4000-pound capacity hooks without modification.

Pull end of control cable assembly out of cargo release hook.

(6) Remove bolts, washers, and nuts securing shackles (33) to cargo release hook (36) and remove cargo release hook.

Note

On 4000-pound cargo release hook each shackle (33) is supported by two links which are bolted to the cargo release hook.

(7) Remove shackles (33) from ends of sling cables.

Note

Shackles (33) are part of cargo release hook and should be kept with cargo release hook.

c. Cleaning. Clean cargo release hook with a clean, lint-free cloth moistened with solvent (item 4, table 1—8).

d. Inspection. Inspect cargo release hook for cracks, dents, burrs, and corrosion.

e. Installation. (1) Position one shackle (33, figure 4—16) through ends of sling cables (24 and 29)

and other shackle through ends of sling cables (21 and 38).

(2) Position shackles (33) on cargo release hook (36) and secure with bolts, washers, and nuts.

Caution

Be sure load beam opens to rear and that pivot end of beam is to the front when cargo release hook is positioned on sling. On 5000-pound cargo release hook, be sure arrow marked FORWARD on right side of hook is pointing forward.

Note

On 4000-pound cargo release hook each shackle (33) is attached by two links to cargo release hook.

(3) Place ball end of control cable assembly (37 or 46) through adapter at top of cargo release hook (36) and out access door opening.

(4) Position ball end of cable in forked end of release lever on 4000-pound cargo release hook (36) located adjacent to latch arm inside access hole and secure with cotter pin. On 5000-pound cargo release hook, move end of latch and lever to upper part of access door opening, curve cable slightly, and slip it into slotted end of latch and lever.

(5) Place ball end of control cable assembly (37 or 46) inside access door opening. Position cable attaching access door on cargo release hook (36) and secure with screws and washers.

Caution

Before securing cable attaching access door, be sure there is a clearance of 1/4 to 1/2 inch between surface of release lever and swaged ball on end of control cable assembly (37 or 46) when release lever is in down or locked position. (See figure 4–17.)

(6) Screw nut (34, figure 4–16) of control cable assembly (37 or 46) on adapter on top of cargo release hook (36).

(7) Connect receptacle (35) of electrical wiring to top of cargo release hook (36).

(8) Perform operational check of cargo release hook (36) in accordance with paragraph *a* above and adjust emergency release control assembly, if required, in accordance with paragraph 4–60*e*.

4–59. *Sling Cables.* There are four sling cables (21, 24, 29, and 38, figure 4–16) used in the cargo sling installation. The sling cables are attached to support plates (19, 26, 30, and 39) installed on the fuselage on each side of the helicopter. The cargo release hook (36) is attached by shackles (33) in the lower ends of the sling cables.

a. Removal. (1) Remove cargo release hook (36, figure 4–16). (Refer to paragraph 4–58*b*.)

(2) Remove screws, washers, and nuts securing clamps (23) on sling cable (24) and electrical wiring (28). Remove clamps.

(3) Remove screws, washers, and nuts securing clamps (22) of stowage cable assembly (32) to sling cables (29 and 38) and remove clamps.

(4) Remove bolts and washers securing support plates (30 and 39) to left side of fuselage. Remove support plates with sling cables (29 and 38) attached.

(5) Remove bolts and washers securing support plate (26) from right side of fuselage on helicopters serial No. prior to 56-4313 and remove support plate with a sling cable (24) attached.

(6) Remove bolts and washers securing step assembly (20) to fuselage below cargo door on helicopters serial No. prior to 56-4313. Remove step assembly with sling cable (21) attached.

(7) Move seat step to up (seat) position in cabin of helicopters serial No. 56-4313 and subsequent. Remove bolts and washers securing lock fittings (18 and 25) to fuselage below cargo door opening and remove lock fittings. Remove bolts and washers securing support plates (19 and 26) to right side of fuselage and remove support plates with sling cables (21 and 24) attached.

(8) Remove bolt, washers, and nut securing each sling cable to its support plate or step assembly (20) on helicopters serial No. prior to 56-4313.

b. Cleaning. Clean sling cables and support plates with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. (1) Inspect sling cables for broken wires, worn spots, and corrosion and end fittings for cracks, bends, and elongated bolt holes.

(2) Inspect support plates for cracks, bends and elongated bolt holes.

d. Installation. (1) Position upper end of each sling cable on its support plate or step assembly (20, figure 4–16) on helicopters serial No. prior to 56-4313 and secure with bolt, washers, and nut.

Caution

Insure that bolt securing sling cable to support plate is installed with bolt head on inboard side.

(2) Position support plates (30 and 39) on left side of fuselage with sling cables (29 and 38) attached and secure with bolts and washers.

(3) Position support plates (19 and 26) on right side of fuselage with sling cables (21 and 24) attached and secure with bolts and washers.

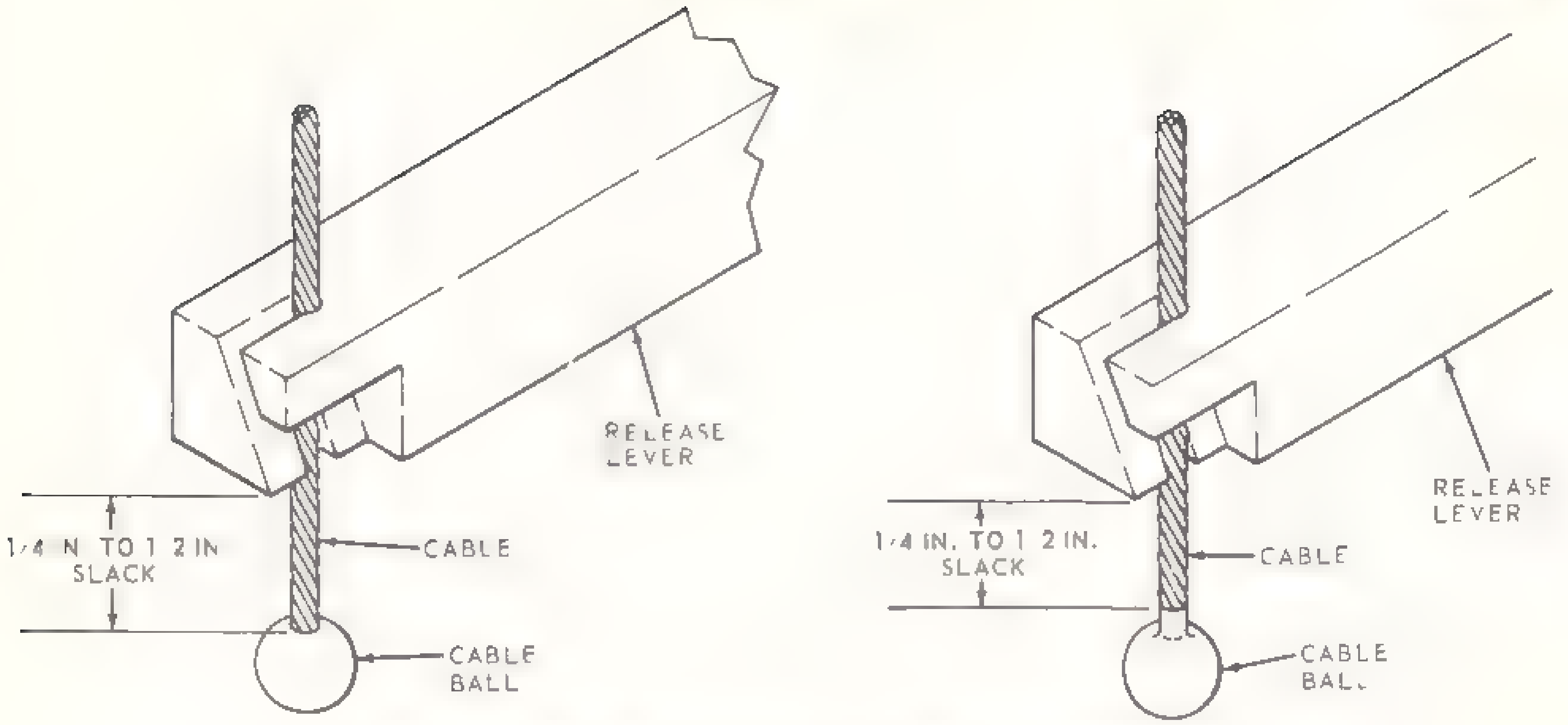


Figure 4—17. Clearance required between cable ball and release lever of cargo release hook

(4) Position lock fittings (18 and 25) on support plates (19 and 26) on helicopters serial No. 56-4313 and subsequent and secure with bolts and washers.

(5) Position step assembly (20) with sling cable (21) attached on right side of fuselage on helicopters serial No. prior to 56-4314 and secure with bolts and washers.

(6) Install cargo release hook (36) on lower ends of sling cables. (Refer to paragraph 4—58*e*.)

(7) Position clamps (22) of stowage cable assembly (32) on sling cables (29 and 38) and secure with screws, washers, and nuts.

(8) Position clamps (23) on sling cable (24) and electrical wiring (28). Secure clamp with screws, washers, and nuts.

Caution

Leave sufficient slack in electrical wiring (28) to allow for sling cable stretch under load conditions.

4—60. Cargo Release Hook Controls. The cargo release hook controls consist of the emergency release control assembly and electrical control assembly. The cargo release hook must be closed manually but may be opened either electrically or mechanically. Opening the hook electrically may be accomplished automatically by means of the CARGO switch on either the pilot's or copilot's cyclic control stick. On helicopters serial No. prior to 56-4284 the primary electrical control for the hook is the three-position MASTER CARGO SLING-SAFE-AUTO switch, located on the overhead control panel. On helicopters serial No. 56-4284 and subsequent this switch is marked MASTER CARGO SLING-ON-SAFE-AUTO and is located on the clutch switch box on the right side of the console. To lock the hook in the closed position, the switch is placed in the SAFE position. The switch should always be kept in the SAFE position when loading or during flight to prevent accidental discharge of the cargo due to wind gusts. To release cargo by means of the CARGO switches, the master switch is placed in the MASTER CARGO SLING or ON position. To release the cargo automatically, the switch is placed in the AUTO position. The hook will then discharge cargo upon contact with the ground. A press-to-test warning light, located next to the master switch, lights up when the cargo release hook is open. The actuator of the emergency release control assembly is located on the pilots' compartment floor to the right of the pilot and is used only in an emergency. Pressing the actuator with the foot will open the hook regardless of the position of the master switch. The cargo sling is stowed from inside the helicopter by pulling the hook up under the left side of the helicopter with the stowage cable assembly and securing the cable to the chock on the cabin wall. Power for the cargo sling electrical control assembly is taken from the primary bus on the overhead control panel. A cargo floodlight is installed in the bottom structure to assist in using the sling during night operations.

Caution

The master switch should not be placed in the AUTO position when a load of less than 200 pounds is suspended from the cargo release hook. Under no circumstances should the master switch be placed in the AUTO position when a load of less than 120 pounds is suspended from the cargo release hook.

a. Removal. (1) Remove emergency release control assembly as follows:

(a) Remove clutch access door to gain access to bottom of actuator assembly (1, figure 4—16) located on pilots' compartment floor.

(b) Remove cotter pin, bolt, washers, and nut securing turnbuckle (15) to lever (8).

(c) Remove cotter pin, bolt, washers, and nut (7) securing lever (8) to lower end of actuator (3).

(d) Depress actuator (3) in pilots' compartment and remove screw, washers, and nut (2) from actuator. Remove actuator, spring (4), and spacer (14) from guide fitting (13).

Caution

Actuator (3) is spring-loaded and is not restrained after screw, washers, and nut (2) are removed.

(e) Remove cotter pin, bolt, washers, nut (9) securing lever (8) between brackets (10 and 11) and remove lever.

(f) Remove screws, washers, and nuts securing brackets (10 and 11) to bracket (6) and remove brackets.

(g) Remove screws, washers, and nuts (5) securing guide fitting (13) on bracket (5) and remove guide fitting.

(2) Remove control cable assembly (17) as follows:

(a) Loosen nut on control cable assembly (17) at pulley (16) located on bulkhead in clutch compartment. Remove cotter pin, bolt, washers, and nut securing pulley in bracket and remove pulley.

(b) Remove screws, washers, and nuts securing clamps and spacers on control cable assembly (17) to bulkhead. Remove clamps and spacers.

Note

Each clamp and spacer should be secured together with lock wire or tape and a note made as to position on control cable assembly (17), as upper spacers are longer.

(c) Remove lock wire and remove turnbuckle (15) from upper end of control cable assembly (17) and slide pulley (16) off of control cable assembly.

(d) Hinge down fuel selector valve and strainer access panel, located on bottom of fuselage forward of main landing gear. Reach inside fuel selector valve and strainer compartment and loosen nut on control cable assembly (17) at pulley (44).

(e) Remove grommet from clutch compartment floor and pull control cable assembly (17) down into fuel selector valve and strainer compartment.

(f) Remove cotter pin, bolt, washer, and nut securing pulley (44) in bracket on bottom of fuselage and remove pulley.

(g) Pull control cable assembly (17) down and out through hole in bottom of fuselage.

(h) Remove screws and washers securing clamps (43) on control cable assembly (17) on bottom of fuselage and remove clamps.

(i) Disconnect spring (41) from plate (42) and bracket at pulley (40) on helicopters serial No. prior to 56-4284. Remove bolt and nut securing end of control cable assembly (17) to end of control cable assembly (37). Remove control cable assembly (17) and plate (42).

(j) Disconnect spring (41) from plate (42) and bracket (45) on helicopters serial No. 56-4284 and subsequent. Remove bolt and nut securing end of control cable assembly (17) to end of control cable assembly (46). Remove control cable assembly (17) and plate (42).

(3) Remove control cable assembly (37 or 46) as follows:

(a) Remove screws, washers, and nuts securing clamps on control cable assembly (37 or 46) or bottom of fuselage and remove clamps.

(b) Remove cotter pin, bolt, washers, and nut securing pulley (40) in bracket on bottom of fuselage on helicopters serial No. prior to 56-4284.

Note

Pulley (40) cannot be removed from control cable assembly (37) until swaged fitting on one end of cable is cut off.

(c) Remove control cable assembly (37 or 46) from cargo release hook (36). (Refer to paragraph 4—58*b*, steps (3) through (5).)

(d) Remove control cable assembly (37 or 46), with pulley (40) on control cable assembly (37).

(4) Remove cable from conduit of each control cable assembly, if to be replaced, as follows:

(a) Cut swaged fitting from one end of each cable to be replaced. Remove pulley from cable of control cable assembly (37) if that cable is being replaced.

Note

Cable is now too short to be used in same control cable assembly.

(b) Grasp end of cable, to be replaced, and pull cable out of conduit.

(5) Remove electrical wiring (28) for electrical control assembly as follows:

(a) Disconnect receptacle (35) from cargo release hook (36).

(b) Disconnect upper end of electrical wiring (28) from terminal block (27).

(c) Remove screws, washers, and nuts securing clamps (23) on electrical wiring (28) and sling cable (24). Remove clamps.

(d) Remove screws and washers securing bracket and gasket on electrical wiring (28) at bottom right side of fuselage and remove bracket, gasket, and electrical wiring from fuselage.

b. Cleaning. (1) Clean actuator assembly with solvent (item 4, table 1–8) and dry with filtered compressed air.

(2) Clean control cable assemblies with a clean, lint-free cloth moistened with solvent (item 4, table 1–8).

(3) Clean electrical wiring with a clean, dry cloth.

c. Inspection. (1) Inspect actuator assembly for cracks, dents, bends, and elongated bolt holes.

(2) Inspect cable of each control cable assembly for fraying, worn spots, kinks, and corrosion.

(3) Inspect conduit of each control cable assembly for dents, crimps, and cleanliness.

(4) Inspect electrical wiring for fraying and deterioration.

d. Installation. (1) Install cable in conduit of each control cable assembly, that was removed for replacement, as follows:

(a) Procure or fabricate a new cable using old cable as a pattern.

(b) Lubricate new cable thoroughly with corrosion preventive compound (item 24, table 1–8).

(c) Slide cable into position in conduit and position pulley (40, figure 4–16) on cable, if cable for control cable assembly (37) was removed. Insure that cable does not drag on conduit.

(d) Swage proper end fitting on each cable that was removed.

(2) Install control cable assembly (37 or 46) as follows:

(a) Connect lower end of control cable assembly (37 or 46) to cargo release hook. (Refer to paragraph 4–58*e*, steps (3) through (8).)

(b) Position pulley (40) with control cable assembly (37) in bracket located on bottom of fuselage and secure with bolt, washers, nut, and cotter pin.

Caution

Do not overtighten nut securing pulley (40). The pulley must be free to rotate without binding or causing kinking of control cable assembly (37).

(c) Position clamps on control cable assembly (37 or 46) and secure to bottom of fuselage with screws, washers, and nuts.

(3) Install control cable assembly (17) as follows:

(a) Position end of control cable assembly (17) on end of control cable assembly (37 or 46) with plate (42) and secure with bolt and nut.

(b) Position pulley (44) in bracket on bottom of fuselage and secure with bolt, washers, nut, and cotter pin.

Caution

Do not overtighten nut securing pulley (44). The pulley must be free to rotate without binding or causing kinking of control cable assembly.

(c) Feed control cable assembly (17) through pulley (44) and through hole in bottom of fuselage, into fuel selector valve and strainer compartment.

(d) Pull control cable assembly (17) through hole in clutch compartment floor and install grommet in hole.

(e) Tighten nut on end of control cable assembly (17) at pulley (44) in fuel selector valve and strainer compartment. Close and secure fuel selector valve and strainer access panel.

(f) Position clamps (43) on control cable assembly (17) and secure to bottom of fuselage with screws and washers.

(g) Connect spring (41) to plate (42) and bracket of pulley (40) on helicopters serial No. prior to 56-4284. On helicopters serial No. 56-4284 and subsequent connect spring (41) to plate (42) and bracket (45).

(h) Position pulley (16) onto cable of control cable assembly (17) and install turnbuckle (15) on upper end of cable. Secure turnbuckle with lock wire.

(i) Position spacers and clamps on control cable assembly (17) in clutch compartment. Secure clamps to bulkhead with screws, washers, and nuts.

Caution

To avoid crimping conduit of control cable assembly (17) do not overtighten screws securing clamps. Check that cable moves freely in the conduit.

Note

Long spacers are installed at upper clamps.

(j) Position pulley (16) in bracket and secure with bolt, washers, nut, and cotter pin.

Caution

Do not overtighten nut securing pulley (16). The pulley must be free to rotate without binding or causing kinking in control cable assembly (17).

(k) Tighten nut on control cable assembly (17) at pulley (16).

(4) Install emergency, release control assembly as follows:

(a) Position guide fitting (13) on bracket (6) located on floor of pilots' compartment and secure with screws, washers, and nuts (5).

(b) Position spacer (14), spring (4), and actuator (3) in guide fitting (13). Press down on actuator and install screw, washers, and nut (2) in upper hole in actuator.

(c) Position brackets (10 and 11) on bottom of bracket (6) in clutch compartment and secure with screws, washers, and nuts (12).

(d) Position lever (8) between brackets (10 and 11), with long slot in lever at the rear, and secure with bolt, washers, nut, and cotter pin (9).

Caution

Lever (8) must pivot freely. Tighten nut fingertight, then back off nut until cotter pin can be installed.

Note

Place a washer on each side of lever (8) before positioning lever between brackets (10 and 11).

(e) Position aft end of lever (8) on lower end of actuator (3) and secure with bolt, washers, nut, and cotter pin (7).

(f) Position end of turnbuckle (15) on forward end of lever (8) and secure with bolt, washers, nut, and cotter pins.

Caution

Turnbuckle (15) must pivot freely. Tighten nut fingertight, then back off nut until cotter pin can be installed.

(g) Check adjustment of emergency release control assembly in accordance with paragraph *e* below.

(h) Install clutch access door on bulkhead in cabin.

(5) Install electrical wiring (28) for electrical control assembly as follows:

(a) Feed upper end of electrical wiring (28) through hole on right side of fuselage and connect to terminal block (27).

(b) Position a gasket and bracket on electrical wiring (28) and secure to right side of fuselage with screws and washers.

(c) Connect receptacle (35) on lower end of electrical wiring (28) to top of cargo release hook (36).

(d) Position clamps (23) on electrical wiring (28) and sling cable (24) and secure with screws, washers, and nuts.

Caution

Leave sufficient slack in electrical wiring (28) to allow for sling cable stretch under load conditions.

(e) Perform operation check of cargo release hook in accordance with paragraph 4–58*a* and adjust emergency release control assembly in accordance with paragraph *e* below, if necessary.

e. Adjustment. Adjust emergency release control assembly when a component of the cargo sling installation has been disconnected, replaced, or circumstances arise that might have caused damage, and frequent enough to insure proper operation when operating under adverse conditions, particularly in dusty or sandy locations.

(1) Open or remove access plate on side or rear of cargo release hook (36, figure 4–16) by removing screws and washers.

(2) With actuator (3), in pilots' compartment, in full UP position, check that load beam of cargo release hook (36) is in CLOSED position, and release lever inside cargo release hook is in full DOWN or LOCKED position. Check that a clearance of 1/4 to 1/2 inch exists between surface of release lever and cable ball. (See figure 4–17.)

Note

If cable ball has sleeve around cable, clearance should be measured from end of sleeve nearest release lever.

(3) Adjust turnbuckle (31), if necessary, to obtain proper clearance. If proper clearance cannot be obtained, replace barrel, part No. AN155-8S, of turnbuckle, with barrel, part No. AN115-8L.

(4) Measure height of top surface of actuator (3) from pilots' compartment floor. Press actuator fully down. The actuator should move approximately 1-7/8 inches. Check that cargo release hook (36) has unlocked.

(5) Release actuator (3). Check that actuator has returned to its original position by repeating measurement outlined in step (4) above.

Note

Failure of actuator (3) to return to its original position indicates that release mechanism is binding or catching, or spring (41) on bottom of fuselage is weak or broken. If spring is weak replace spring.

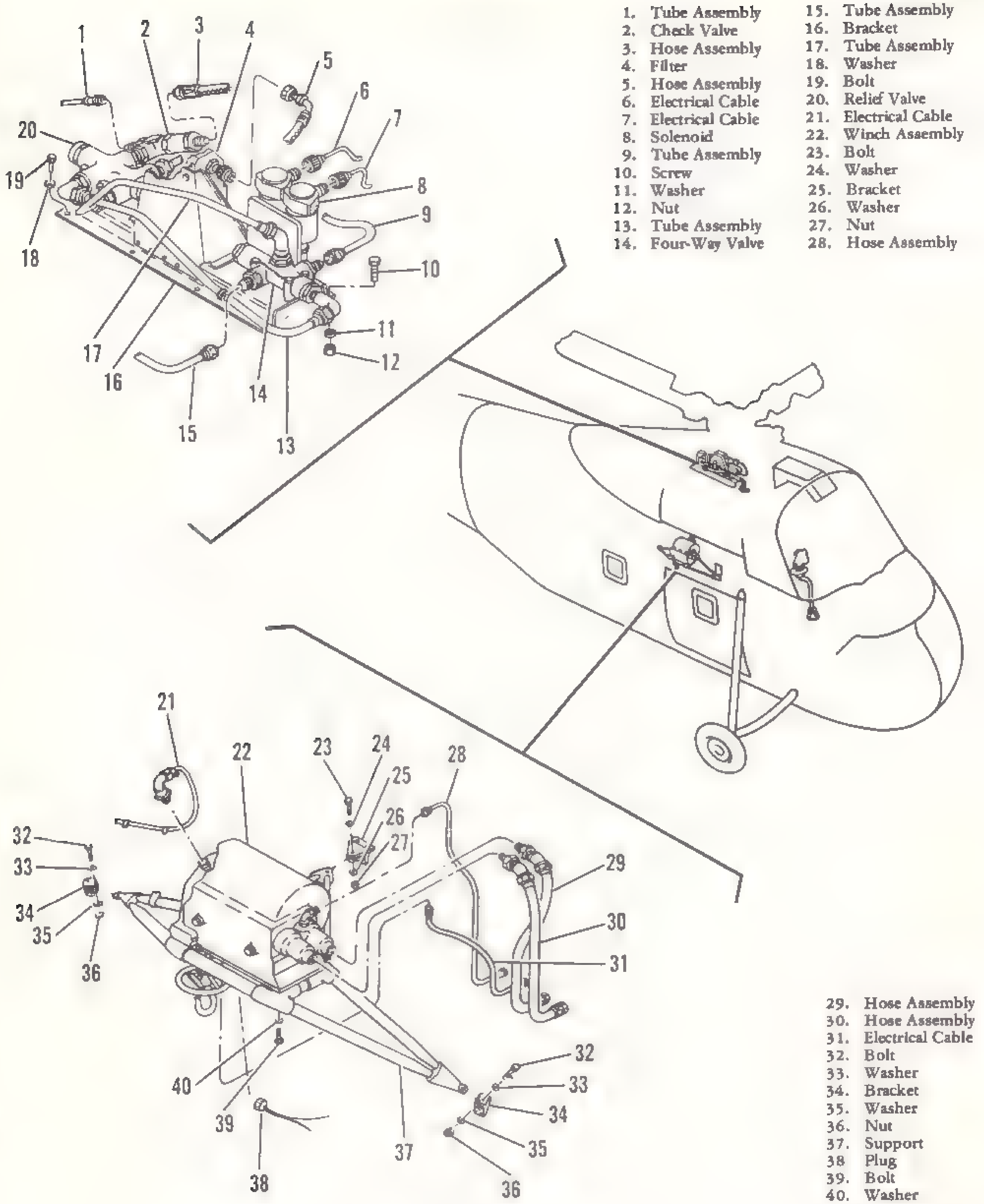
(6) Close load beam of cargo release hook (36). Check for proper clearance between release lever and cable ball as outlined in step (2) above.

(7) Close or position access plate on cargo release hook (36) and secure with screws and washers.

(8) Perform operational check of cargo release hook (36) in accordance with paragraph 4–58*a*.

4–61. Rescue Hoist System. The rescue hoist system (figure 4–18) consists of a winch assembly and rescue hoist hydraulic system. The winch assembly consists of a winch, hydraulic motor, guillotine, circuit tester, support, and necessary control switches. For information covering the rescue hoist hydraulic system,

1. Tube Assembly
2. Check Valve
3. Hose Assembly
4. Filter
5. Hose Assembly
6. Electrical Cable
7. Electrical Cable
8. Solenoid
9. Tube Assembly
10. Screw
11. Washer
12. Nut
13. Tube Assembly
14. Four-Way Valve
15. Tube Assembly
16. Bracket
17. Tube Assembly
18. Washer
19. Bolt
20. Relief Valve
21. Electrical Cable
22. Winch Assembly
23. Bolt
24. Washer
25. Bracket
26. Washer
27. Nut
28. Hose Assembly



29. Hose Assembly
30. Hose Assembly
31. Electrical Cable
32. Bolt
33. Washer
34. Bracket
35. Washer
36. Nut
37. Support
38 Plug
39. Bolt
40. Washer

Figure 4—18. Rescue hoist system

refer to paragraphs 6–31 through 6–37. On helicopters serial No. prior to 56-4284 internal structural provisions are incorporated for the installation of the winch assembly. On helicopters serial No. 56-4284 and subsequent complete provisions for the rescue hoist system are incorporated.

4–62. *Winch Assembly.* The winch assembly (22, figure 4–18) of the rescue hoist system is mounted on three brackets over the cargo door on the right side of the helicopter. (See figure 4–19.) The winch assembly has a rated load of 600 pounds. The winch is composed of a cable drum gear driven by the hydraulic motor, a load-holding brake, a level-wind mechanism for the cable, a rubber-covered roller to prevent snarling of the cable when unreeling without a load, limit switches to cut off power at both extremes of travel, and a rubber bumper at the cable end fitting. An electrically operated, cartridge-type guillotine is installed in the winch assembly. The guillotine is controlled by spring-loaded switches marked EMER CABLE-CUT-OFF, one located adjacent to the HOIST-CREW-OFF-PILOT switch on the overhead switch panel and the other located adjacent to the cabin HOIST switch. The pilot's EMER CABLE CUT-OFF switch is always operative. The crew's EMER CUT-OFF switch is operative only when the master switch is in the CREW position. All hoist switches are inoperative while either the pilot's or the crew's emergency cable cutoff is in operation. The hydraulic motor, mounted on the stationary housing of the winch assembly, drives the drum through two stages of planetary gear reductions. The proper setting of the relief valve assures continuous, intermittent, continuous reversing, or stalled operation of the motor without damage to the motor. The direction of rotating of the motor is determined by the direction of fluid flow through the motor which, in turn, is governed by the four-way valve. The rated displacement of the hydraulic motor is 0.600 cubic-inch-per-revolution. The drum is partly filled with lubricating oil (item 10, table 1–8) to lubricate all rotating parts, such as gearing and brakes, and also to carry away heat created by brake slippage. An oil filler hole, located at the motor end of the main casting, also serves as a level indicator and as a drain.

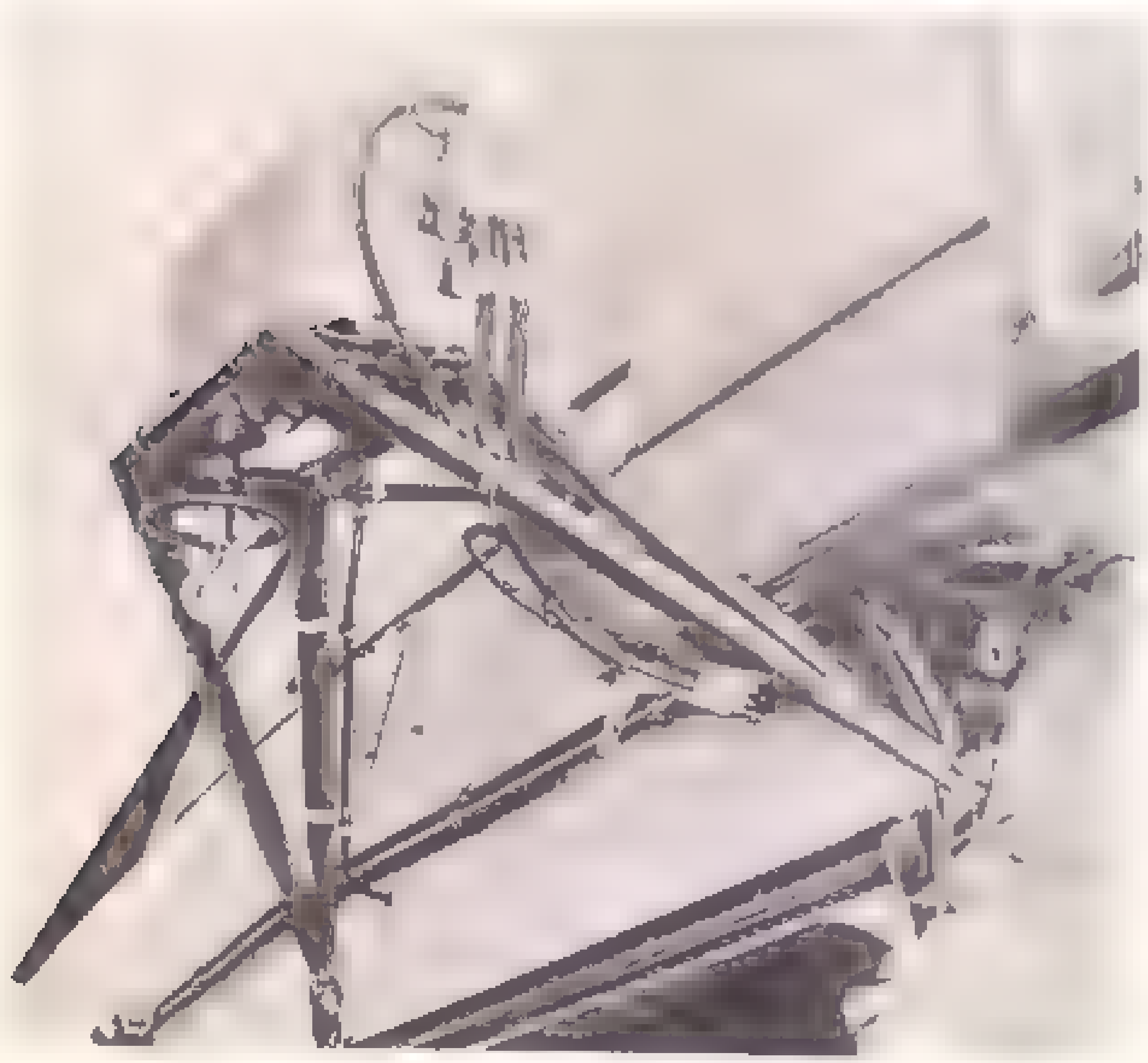


Figure 4–19. Winch assembly installed

a. Operational check. A circuit tester is installed in the cabin above the cargo door and is used to determine if the guillotine cartridge is ready for use. The circuit tester will also determine if the wiring is faulty.

(1) Place battery switch located on main switch panel in ON position.

(2) Place master hoist switch located on overhead control panel in the CREW position.

(3) Place test box switch on circuit tester in TEST position.

Warning

If the switch is in the FIRE position, the cartridge will fire.

(4) Cut lock wire on crew's EMER CABLE CUT-OFF switch guard located on crew hoist panel. Momentarily put crew's emergency cable cutoff switch in the SHEAR position. At same time, green test light on test box should light.

Note

If green light does not light, it is an indication that cartridge or wiring is faulty.

Replace guillotine cartridge once a year if cartridge was not used.

(5) Secure crew's EMER CABLE CUT-OFF switch guard with lock wire.

(6) Place master hoist switch on overhead control panel in PILOT position.

(7) Perform steps (4) and (5) with pilot's shear switch. Secure pilot's EMER CABLE CUT-OFF switch guard with lock wire.

(8) Place test box switch on circuit tester in FIRE position.

Warning

Always place the switch in the FIRE position after testing. The guillotine will not operate if the switch is in the TEST position.

(9) Place master hoist switch on overhead control panel in OFF position.

(10) Place battery switch on main switch panel in OFF position.

(11) Circuit is ready for operation.

b. Removal. (1) Disconnect electrical cables (21 and 31, figure 4–18) from winch assembly (22) and remove clamps securing electrical cables on support (37).

(2) Disconnect hose assemblies (28, 29, and 30) from hydraulic motor of winch assembly (22). Cap ends of hose assemblies and open ports of winch assembly.

(3) Disconnect plug (38) from guillotine at bottom of winch assembly (22). Remove clamps securing electrical wires of plug to support (37).

(4) Remove bolts (39) and washers (40) securing winch assembly (22) on support (37). Remove winch assembly from support.

(5) Remove bolts (32), washers (33 and 35), and nuts (36) securing support (37) on brackets (34).

(6) Remove bolt (23), washers (24 and 26), and nut (27) securing support (37) to bracket (25). Remove support from brackets.

c. Cleaning. Clean winch assembly and support with a clean, lint-free cloth moistened with solvent (item 4, table 1–8).

d. Inspection. (1) Inspect winch assembly for cracks, dents, bends, and corrosion.

(2) Inspect support and brackets for cracks, dents, bends, and elongated bolt holes.

e. Installation. (1) Position support (37, figure 4–18) on bracket (25) and secure with bolt (23), washers (24 and 26), and nut (27).

(2) Position support (37) on brackets (34) and secure with bolts (32), washers (33 and 35), and nuts (36).

(3) Position winch assembly (22) on support (37) and secure with bolts (39) and washers (40).

Note

The motor housing must be completely filled with hydraulic fluid (item 3, table 1–8) before installation of the winch assembly.

(4) Remove caps from end of hose assemblies and ports of winch assembly (22).

(5) Connect hose assemblies (29 and 30) to forward end of hydraulic motor and hose assembly (28) to elbow in top of hydraulic motor.

Caution

Make certain hose assemblies are connected to the correct port of the hydraulic motor. The hose assembly connected to elbow A, B, or C stenciled on fuselage skin is connected to port A, B, or C stenciled on the hydraulic motor of the winch assembly.

(6) Connect electrical cables (21 and 31) to winch assembly (22) and plug (38) to guillotine at bottom of winch assembly.

(7) Secure electrical wires of plug (38) and electrical cables (21 and 31) to support (37) with clamps.

(8) Check guillotine cartridge with circuit tester in accordance with paragraph *a* above.

(9) Service winch assembly with lubricating oil (item 10, table 1–8). (Refer to table 1–5.)

(10) Adjust upper limit switch in accordance with paragraph *f* below.

f. Adjustment (upper limit switch). (1) Reel in entire cable to test operation of upper limit switch. If motor shuts off when cable is entirely reeled in, there is no adjustment necessary.

(2) If motor remains in operation after cable is reeled in, check tension of upper limit switch spring and adjust upper limit switch.

(3) Reel in cable and adjust upper limit switch to close when bumper assembly (2, figure 4–20) reaches cable guide and rubber bumper is compressed approximately 1/8 inch by contact assembly (3).

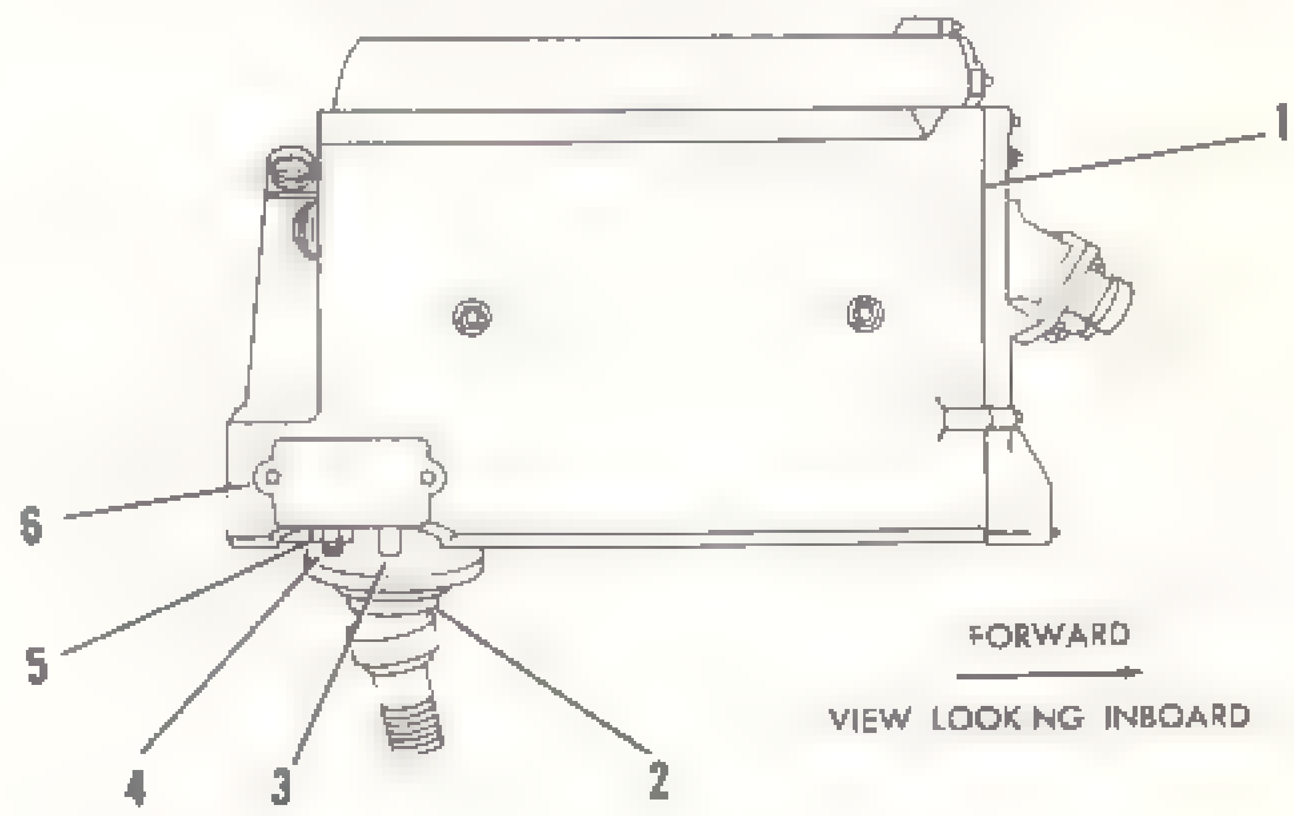
(4) Adjust upper limit switch by backing off hex nut (5) and setting adjusting screw (4) until upper limit switch is actuated by contact assembly (3).

(5) Tighten hex nut (5) when proper adjustment is reached.

Note

On helicopters operated over salt water, cable travel may be restricted due to salt deposits on the switch pin. Remove deposit with cloth (item 38, table 1–8) and lubricate pin with grease (item 29, table 1–8).

4–63. Aft Fuselage Section (Tail Cone). The aft fuselage section (tail cone) (10, figure 1–6) is located aft of the heater compartment and is accessible only through the heater compartment. The pylon (11) is attached to the aft end of the aft fuselage section and



1. Main Housing
2. Bumper Assembly
3. Contact Assembly
4. Adjusting Screw
5. Hex Nut
6. Limit Switch Cover

Figure 4–20. Adjustment of winch

the tail landing gear assembly is attached to the lower rear portion. The fourth section of the tail rotor drive shaft, tail rotor controls, and tail landing gear lock controls are routed through the aft fuselage section.

Section III Empennage Section

4–64. Description. The empennage section consists of a fixed horizontal stabilizer attached to the pylon. There is no vertical stabilizer; however, the pylon acts as a vertical stabilizer. For description of the pylon refer to paragraph 4–69.

4–65. Horizontal Stabilizer. The horizontal stabilizer (figure 4–21) is secured to the pylon to increase longitudinal stability of the helicopter during forward flight. The horizontal stabilizer is an airfoil section and consists of magnesium and aluminum frames covered by magnesium skin. The horizontal stabilizer is attached by hinge fittings on the horizontal stabilizer aft spar to fittings on the pylon front spar. The horizontal stabilizer turnbuckle (figure 4–22) secured at the horizontal stabilizer forward spar is attached by a fitting to the pylon front spar and provides adjustment of the angle of incidence of the horizontal stabilizer. The adjustment is made only while on the ground. A step area, forward and left of the horizontal stabilizer attaching point, is reinforced to sustain weight of personnel during maintenance of the tail rotor, pylon, and pylon equipment.

4–66. *Cleaning.* Clean horizontal stabilizer in accordance with paragraph 1–62.

4–67. *Inspection. a.* Remove upper and lower fairings from horizontal stabilizer. (See figure 1–9.)

b. Inspect horizontal stabilizer fittings and horizontal stabilizer turnbuckle for cracks, breaks, corrosion, and security of attachment.

c. Install upper and lower fairings on horizontal stabilizer.

4–68. *Adjustment. a.* Remove upper and lower fairings from horizontal stabilizer. (See figure 1–9.)

b. To set horizontal stabilizer in neutral position, adjust horizontal stabilizer turnbuckle (figure 4–22) to measure 6.812 inches from center-to-center of each turnbuckle fork.

c. Install upper and lower fairings on horizontal stabilizer.

Figure 4–21. Horizontal stabilizer installed

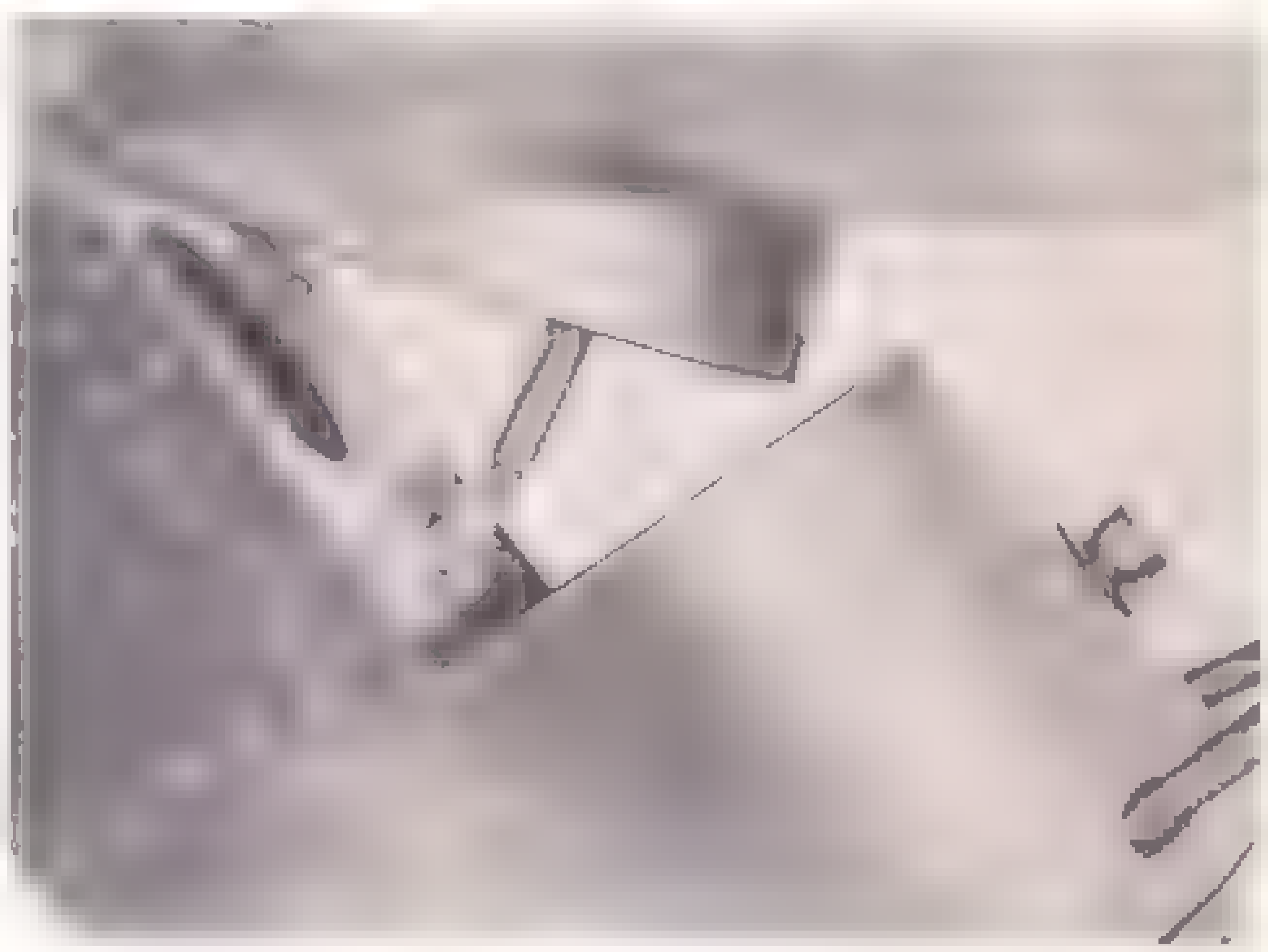


Figure 4–22 Horizontal stabilizer turnbuckle installed

Section IV Pylon Section

4–69. Description. (See figure 1–6.) The pylon (foldable tail section) is supported by the aft fuselage section (tail cone) to which it is secured at station 448 by hinges and the pylon folding hinge lock. When the hinge lock is unlocked, the pylon can be folded forward along the left side of the aft fuselage section. The pylon supports the horizontal stabilizer, the intermediate and tail rotor gear boxes with associated equipment, the tail rotor assembly, the yellow position light, and a portion of the tail rotor flight controls.

4–70. *Cleaning.* Clean pylon in accordance with paragraph 1–62.

4–71. *Inspection. a.* Remove top fairing grill, tail rotor gear box fairing cover, and intermediate gear box panel. (See figure 1–9.)

b. Inspect intermediate and tail rotor gear box fittings for cracks, breaks, corrosion, and security of attachment.

c. Remove disconnect shaft and intake fairing. (See figure 1–9.)

d. Inspect tail rotor drive shaft disconnect coupling ring doubler for cracks, breaks, corrosion, distortion, and security of attachment.

e. Open pylon in accordance with paragraph 1–54.

f. Inspect pylon upper and lower hinge fittings for cracks, breaks, corrosion, and security of attachment.

g. Close pylon in accordance with paragraph 1–55.

h. Install disconnect shaft and intake fairing, intermediate gear box panel, tail rotor gear box fairing cover, and top fairing grill.

Section V Wing Section

Not Applicable

Section VI Alighting Gear

4–72. Description. The alighting gear for the CH-34 helicopter consists of two nonretractable main landing gear assemblies and a tail landing gear assembly. Each main landing gear assembly is attached to fittings on each side of the forward fuselage section. The tail landing gear assembly is attached to fittings inside the aft fuselage section (tail cone).

4–73. Main Landing Gear Assemblies. Each main landing gear assembly (figure 4–23) consists of a shock strut assembly, leg and axle assembly, main wheel assembly, and brake assembly. A static ground assembly is installed on the left leg and axle assembly. The brake assembly is installed on inboard side of each main wheel assembly.

4–74. *Shock Strut Assemblies.* Each shock strut assembly (9, figure 4–24) consists of a tube assembly, oleo assembly, and universal assembly. Each shock strut assembly is attached at the lower end to a universal assembly on the leg and axle assembly (29) and extend diagonally upward to a fitting on the side of the forward fuselage section. The shock strut assemblies cushion the impact when landing the helicopter. The helicopter can be leveled by adjusting the amount of air pressure in the shock strut assemblies.

a. Servicing. Service each shock strut assembly with air pressure and fill with hydraulic fluid in accordance with instructions on nameplate (3, figure 4–24) and the following:

(1) Check shock strut assembly for correct air pressure as follows:

(a) Remove cap from air valve (1) and insure that 5/8-inch hex swivel nut is tight.

(b) Install a suitable air gage on air valve (1) and loosen 5/8-inch hex swivel nut a maximum of three-fourths of a turn. Check air gage for air pressure reading.

Caution

Excess loosening of 5/8-inch hex swivel nut will result in core and housing of air valve to drop into shock strut assembly.

(c) Check reading of air gage against air pressure reading on nameplate (2) and check shock strut assembly for proper extension.

(d) Inflate or deflate shock strut assembly to extension dimension indicated on nameplate (2). (Refer to paragraph (2) or (3) below.)

Figure 4—23. Main landing gear assembly installed

Note

The air pressure will remain constant and is governed by the weight of helicopter.

(e) Tighten 5/8-inch hex swivel nut to a torque of 50 to 70 inch-pounds.

(f) Remove air gage from air valve and install cap.

Note

Check air valve for leakage of air before installing cap.

(2) Inflate shock strut assembly as follows:

(a) Remove cap from air valve (2) and insure 5/8 inch hex swivel nut is tight.

(b) Attach air filling chuck of air gage to air valve (2).

(c) Loosen 5/8-inch hex swivel nut on air valve a maximum of three-fourths of a turn.

Caution

Excess loosening of 5/8-inch hex swivel nut will result in core and housing of air valve to drop into shock strut assembly.

(d) Inflate shock strut assembly until it starts to extend. Roll helicopter forward 2 or 3 feet before inflating to relieve friction in shock strut assembly.

(e) Take air pressure reading of each shock strut assembly and inflate shocks strut assemblies until they are extended to dimension indicated on nameplate.

(f) Tighten 5/8-inch hex swivel nut to a torque of 50 to 70 inch-pounds.

(g) Remove air filling chuck of air gage from air valve and install cap.

Note

Check air valve for leakage of air before installing cap.

(3) Deflate shock strut assembly as follows:

(a) Remove cap from air valve and insure that 5/8-inch hex swivel nut is tight.

(b) Release air pressure from air valve by pressing valve core with a valve core tool.

Note

Do not use a matchstick-type tool.

(c) Remove valve core from air valve after air pressure is released from air valve, using a valve core tool.

Warning

Do not remove valve core until all air pressure is released from air valve.

(d) Loosen 5/8-inch hex swivel nut a maximum of one complete turn and release air pressure from shock strut assembly.

Caution

Excess loosening of 5/8-inch hex swivel nut will result in air valve dropping into shock strut assembly.

1. Air Valve
2. Boot
3. Nameplate
4. Clamp
5. Screw, Washers, Nut
6. Clamp
7. Screw, Washers, Nut
8. Oleo Assembly
9. Shock Strut Assembly
10. Bearing
11. Retainer
12. Retaining Ring
13. Washer
14. Cotter Pin
15. Nut
16. Main Wheel Assembly
17. Bearing
18. Retainer
19. Retaining Ring
20. Axle
21. Hydraulic Line
22. Static Ground Assembly
23. Bolt, Nut
24. Bolt, Washer, Nut
25. Elbow, Check Valve
26. Brake Assembly
27. Elbow
28. Brake Disc
29. Leg and Axle Assembly

Figure 4—24. Main landing gear assembly installation (Sheet 1 of 2)

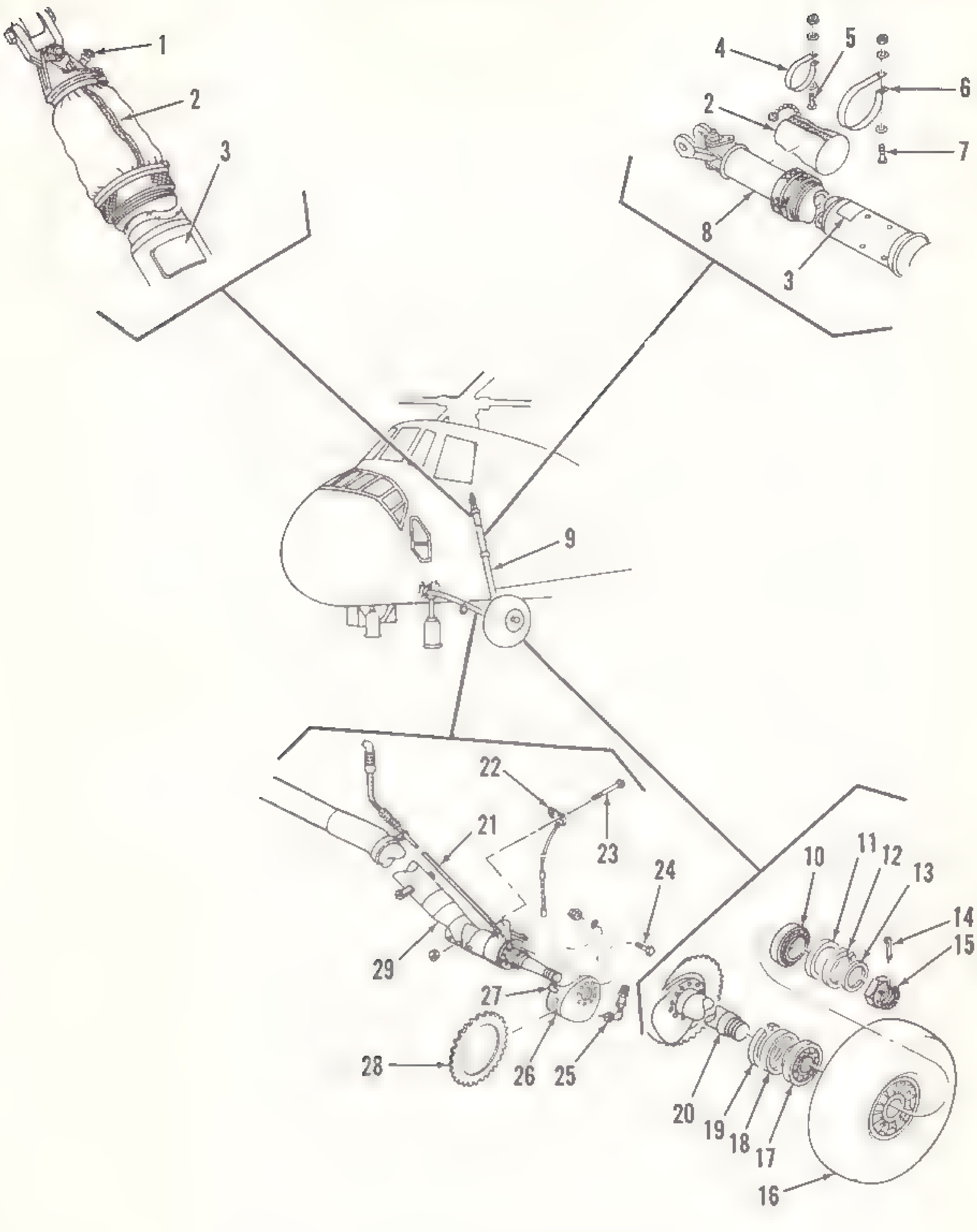


Figure 4—24. Main landing gear assembly installation (Sheet 2 of 2)

(4) Fill and bleed shock strut assembly with hydraulic fluid (item 3, table 1–8) as follows:

Note

The shock strut assembly can be filled or bled with it removed or installed.

(a) Release air pressure from shock strut assembly in accordance with paragraph (3) above.

(b) Remove lock wire and remove air valve from shock strut assembly.

(c) Jack helicopter in accordance with paragraph 1–48*c*.

(d) Fully compress shock strut assembly, (if removed hold in upright position) and fill shock strut assembly with hydraulic fluid (item 3, table 1–8) through opening where air valve was removed.

(e) Work shock strut assembly up and down several times to remove air bubbles that may be trapped in shock strut assembly. Refill shock strut assembly with hydraulic fluid until it is level with opening of air valve.

(f) Install air valve and tighten to a torque of 100 to 110 inch-pounds. Secure air valve with lock wire.

(g) Lower jack and remove from helicopter.

(h) Inflate shock strut assembly in accordance with paragraph (2) above.

b. Cleaning. (1) Clean shock strut assemblies with soap (item 14, table 1–8) and water. Rinse thoroughly with clean water and allow to dry.

(2) Remove screws, washers, and nuts (5 and 7, figure 4–24) and remove clamps (4 and 6) securing boot (2) on oleo assembly (8). Open zipper of boot and remove boot.

(3) Clean polished surface of oleo assembly (8) with a clean, lint-free cloth moistened with hydraulic fluid (item 3, table 1–8).

(4) Position boot (2) on oleo assembly (8) and close zipper. Position clamps (4 and 6) on boot and secure with screws, washers, and nuts (5 and 7).

c. Inspection. (1) Inspect shock strut assemblies for cracks, dents, corrosion, and security of attachment.

(2) Check shock strut assembly for correct air pressure and hydraulic fluid level. (Refer to paragraphs *a* (1) and (4) above.)

4–75. *Leg and Axle Assemblies.* The leg and axle assemblies (29, figure 4–24) are installed in fittings on each side of the bottom structure of the forward fuselage structure. Each leg and axle assembly has a jack pad, step, and tiedown ring installed, with the hydraulic line (21) for each brake assembly (26) secured to each leg. The brake assembly and main wheel assembly (16) are installed on the axle (20) of each leg and axle assembly. Each shock strut assembly (9) is attached to a universal fitting on the leg and axle assembly.

a. Cleaning. Clean leg and axle assemblies with soap (item 14, table 1–8) and water. Rinse thoroughly with clean water and allow to dry.

b. Inspection. Inspect leg and axle assemblies for cracks, dents, bends, corrosion, and security of attachment.

4–76. *Main Wheel Assemblies.* Each main wheel assembly (16, figure 4–24) consists of a tire, tube, and wheel. The tire is 11.00 x 12, type 3, six-ply nylon and the tube is 11.00 x 12. Each wheel is the two-section type with a bearing installed in each wheel half. The inboard wheel half has a serrated ring installed for fitting the brake disc (28) of brake assembly (26).

a Removal. (1) Jack helicopter in accordance with paragraph 1–48*b*.

(2) Remove cotter pin (14, figure 4–24), nut (15), and washer (13) and remove each main wheel assembly (16) from axle (20).

(3) Remove retaining rings (12 and 19), retainers (11 and 18) and remove bearings (10 and 17) from wheel hub.

(4) Remove valve core from valve stem and deflate tube.

Caution

Allow tube to completely deflate before separating wheel halves.

(5) Break tire beads loose from wheel flanges.

Note

Use a rubber mallet to loosen tire beads from wheel flanges.

(6) Remove bolts, washers, and nuts securing wheel halves together and remove outboard wheel half from tire and tube.

(7) Remove tire and tube from inboard wheel half and remove tube from tire.

b. Cleaning. (1) Clean all metal components of main wheel assemblies with solvent (item 4, table 1–8) and dry with filtered compressed air.

(2) Clean tires with a mild solution of soap (item 14, table 1–8) and water. Rinse tires with clean water and allow to air dry.

c. Inspection. (1) Inspect each wheel half for cracks, dents, and out-of-round condition.

(2) Inspect serrated ring installed on inboard wheel half for worn teeth, burrs, nicks, and security of attachment.

(3) Inspect cup in hub of each wheel half for flaking pitting, cracks, and evidence of excessive heat.

(4) Inspect each bearing for flaking, pitting, bends, cracks, and evidence of excessive heat.

(5) Insure that bearings seat properly on axle and in hub of each wheel half.

(6) Inspect tires for cracks, cuts, breaks, worn spots, and embedded foreign objects.

d. Installation. (1) Dust inside of tire with a small amount of compound (item 77, table 1–8) and position tube in tire.

Note

Position valve stem in line with balance mark on tire.

(2) Position tire and tube on inboard wheel half and outboard wheel half on tire and tube.

(3) Align bolt holes in wheel halves and install bolts, washers, and nuts. Tighten nuts to a torque of 15 foot-pounds.

Caution

Do not pinch tube between wheel halves. The tire can be pushed down to check tube before tightening nuts.

(4) Inflate and deflate tube several times to seat tire beads on wheel flanges and remove any wrinkles from tube.

(5) Install valve core in valve stem and inflate tube and tire in accordance with table 1–5.

(6) Hand-pack bearings (10 and 17, figure 4–24) and lightly coat axle (20) with grease (item 21, table 1–8).

(7) Position bearings (10 and 17) in hub of wheel and install retainers (11 and 18) and retaining rings (12 and 19).

(8) Position main wheel assembly (16) on axle (20) and engage teeth of brake disc (28) with serrated ring on inboard wheel half.

(9) Secure main wheel assembly (16) on axle with washer (13) and nut (15). Tighten nut just enough to remove end play and install cotter pin (14).

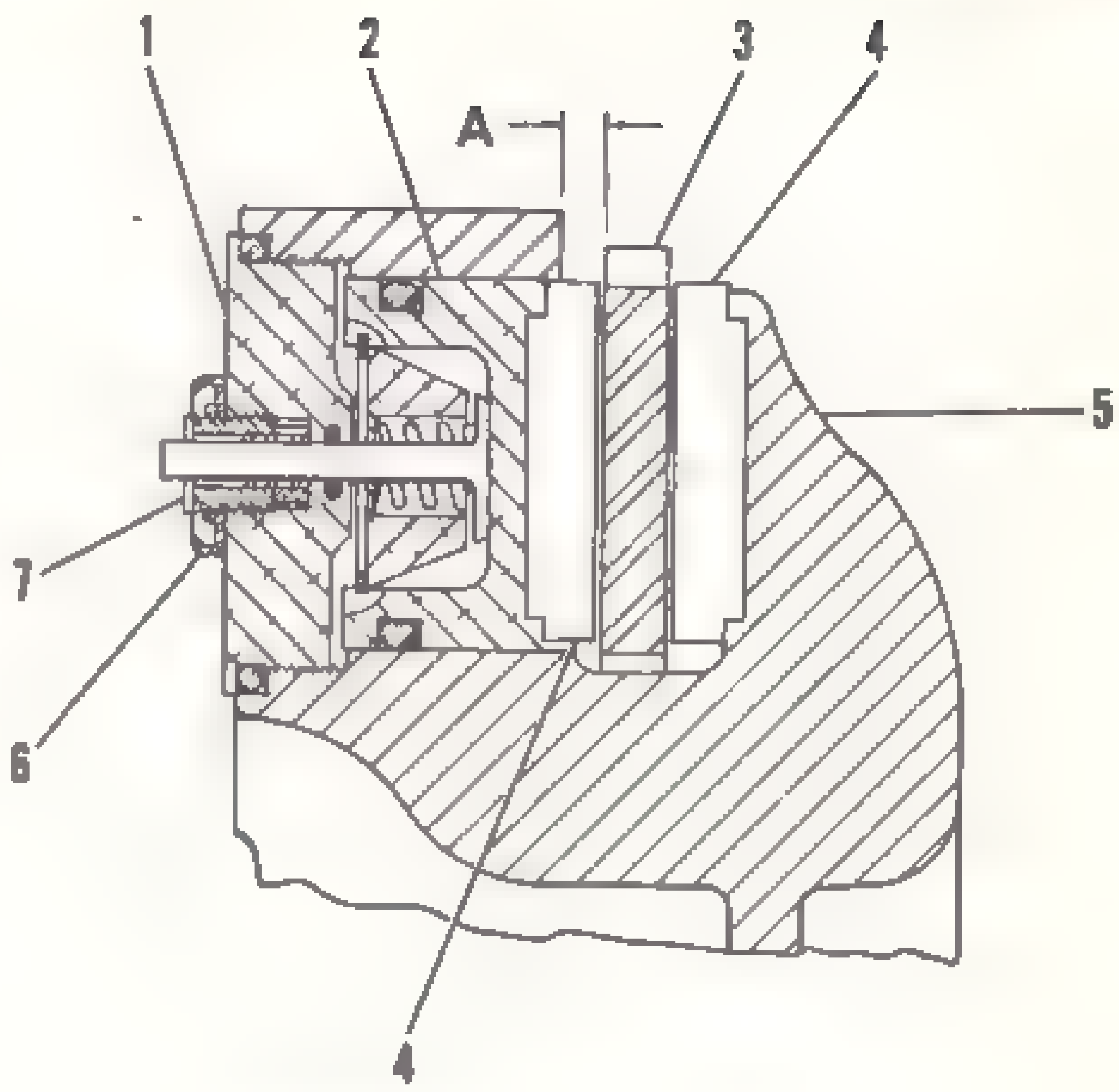
(10) Lower jack and remove from helicopter.

4–77. *Brake Assemblies.* A brake assembly (26, figure 4–24) is mounted on the flange of axle (20) at the inboard side of each main wheel assembly (16). The brake assemblies are actuated by hydraulic fluid pressure from the brake hydraulic system. Each brake assembly consists of a brake disc (28) and housing assembly. The housing assembly contains three interconnected cylinders and six brake linings. Three brake linings are moveable and three are stationary.

a. Removal. (1) Jack helicopter in accordance with paragraph 1–48*b*.

(2) Remove main wheel assembly (16, figure 4–24) in accordance with paragraph 4–76*a*, step (2).

(3) Check brake assembly (26) for worn brake linings (4, figure 4–25) before removing brake assembly from axle (20, figure 4–24) by setting parking brake and measuring distance (A, figure 4–25) between brake disc (3) and housing (5) of each brake assembly. If distance measures 7/16-inch or greater, replace brake linings.



1. Cylinder Head
2. Piston
3. Brake Disc
4. Brake Lining
5. Housing
6. Palnut
7. Threaded Bushing

Figure 4–25. Replacement of brake linings

(4) Replace unserviceable brake linings (4) of brake assembly having torque-type adjusting nut as follows:

(a) Loosen adjusting nut one-fourth turn.

(b) Slide brake disc (3) from housing (5) of brake assembly.

(c) Remove worn brake linings (4) from piston (2) and housing (5).

(d) Force piston (2) toward cylinder head (1) as far as possible and install new brake linings (4) in piston and housing (5).

(e) Position brake disc (3) between brake linings (4).

(f) Grasp brake disc (3) and pull sideways to hold piston (2) in off position. Tighten adjusting nut to a torque of 25 foot-pounds.

(5) Replace brake linings (4) of brake assemblies which have palnuts (6) and thread bushings (7) installed (torqueless-type brake assemblies) as follows:

(a) Slide disc (3) from housing (5) of brake assembly.

(b) Place a flat bar between brake linings (4) and force piston (2) toward cylinder head (1) as far as pos-

sible. Remove worn brake linings from pistons and housing (5).

(c) Install new brake linings (4) in pistons (2) and housing (5).

(d) Install brake disc (3) between brake linings (4).

(6) Disconnect hydraulic line (21, figure 4–24) from elbow (27) in brake assembly (16) and cap elbow and end of hydraulic line.

(7) Remove bolts, washers, and nuts (24) securing brake assembly (26) on flange of axle (20) and remove brake assembly.

(8) Remove elbow (27) and elbow and check valve (25) from brake assembly (26), if brake assembly is to be replaced.

b. Cleaning. Clean brake assemblies with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. (1) Inspect housing of each brake assembly for cracks, dents, and corrosion.

(2) Inspect brake disc for cracks, warping (usually caused by excessive heat), dents, burrs, worn teeth, and excessive scoring.

d. Installation. (1) Install elbow (27, figure 4–24) and elbow and check valve (25) in brake assembly (26); if brake assembly is replaced.

(2) Position brake assembly (26) on flange of axle (20) and secure with bolts, washers, and nuts (24).

Note

Position brake assembly as near as possible to a 90-degree angle forward of centerline of axle to provide sufficient clearance of universal fitting and bolts when shock strut assembly is fully extended.

(3) Remove caps and connect hydraulic line (21) to elbow (27).

(4) Fill and bleed wheel brake hydraulic system in accordance with paragraph 6–40.

(5) Install main wheel assembly (16) on axle (20) in accordance with paragraph 4–76*d*, steps (6), (8), and (9).

(6) Lower jack and remove from helicopter.

4–78. Static Ground Assembly. The static ground assembly (22, figure 4–24) is installed on the left leg and axle assembly (29) just inboard of the left main wheel assembly.

a. Removal. Remove bolts and nuts (23, figure 4–24) and remove static ground assembly (22) from leg and axle assembly (29).

b. Cleaning. Clean static ground assembly with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect static ground assembly for cracks, kinks, and corrosion.

d. Installation. Position static ground assembly (22, figure 4–24) on leg and axle assembly (29) and secure with bolts and nuts (23).

e. Adjustment. Loosen nut securing cable in mounting bracket and move cable up or down in mounting until cable is in contact with ground and tighten nut.

4–79. Tail Landing Gear Assembly.

The tail landing gear assembly (figure 4–26) is attached to fittings in the aft end of the aft fuselage section (tail cone). The tail landing gear assembly consists of a tail wheel assembly, shock strut assembly, yoke and fork assembly, and tail wheel lock control assembly. The tail wheel assembly can swivel through 360 degrees, but is self-centering and can be locked in the trailing position by the tail wheel lock control assembly.

4–80. Tail Wheel Assembly. The tail wheel assembly (27, figure 4–27) consists of a tire, tube, and wheel. The tire is 6:00 x 6, type 3, six-ply nylon and the tube is 6:00 x 6. The wheel is the two-section type with a bearing installed in each wheel half.

a. Removal. (1) Jack helicopter in accordance with paragraph 1–48*c*.

(2) Remove nut (26, figure 4–27), washer (25), and spacer (24) and remove tail wheel assembly (27) from axle.

Figure 4–26. Tail landing gear assembly installed

(3) Remove screws (20) and clips (21) and remove retainers (23 and 29) and bearings (22 and 28) from hub of wheel.

(4) Remove valve core from valve stem and deflate tube.

Caution

Allow tube to completely deflate before separating wheel halves.

(5) Break tire beads loose from wheel flanges.

Note

Use a rubber mallet to loosen tire beads from wheel flanges.

(6) Remove bolts, washers, and nuts securing wheel halves together and remove wheel halves from tire and tube.

(7) Remove tube from tire.

b. Cleaning. (1) Clean all metal components of tail wheel assembly with solvent (item 4, table 1–8) and dry with filtered compressed air.

(2) Clean tire with a mild solution of soap (item 14, table 1–8) and water. Rinse tire with clean water and allow to air dry.

c. Inspection. (1) Inspect each wheel half for cracks, dents, and out-of-round condition.

(2) Inspect cup in hub of each wheel half for flaking, pitting, cracks, and evidence of excessive heat.

(3) Inspect each bearing for flaking, pitting, bends, cracks, and evidence of excessive heat.

(4) Insure that bearings seat properly on axle and in hub of each wheel half.

(5) Inspect tire for cracks, cuts, breaks, worn spots, and embedded foreign objects.

d. Installation. (1) Dust inside of tire with a small amount of compound (item 77, table 1–8) and position tube in tire.

Note

Position valve stem in line with balance mark on tire.

(2) Position wheel halves in tire and tube and align bolt holes. Secure wheel halves together with bolts, washers, and nuts.

Caution

Do not pinch tube between wheel halves. The tire can be pushed down to check tube before tightening nuts.

(3) Inflate and deflate tube several times to seat tire beads on wheel flanges and remove any wrinkles from tube.

(4) Install valve core in valve stem and inflate tube and tire in accordance with table 1–5.

(5) Hand-pack bearings (22 and 28, figure 4–27) and lightly coat axle with grease (item 21, table 1–8).

(6) Position bearings (22 and 28) and retainers (23 and 29) in hub of wheel and secure with clips (21) and screws (20).

(7) Position tail wheel assembly (27) on axle and install spacer (24), washer (25), and nut (26).

(8) Tighten nut (26) just enough to remove end play and bend washer (25) over nut.

4–81. Shock Strut Assembly. The shock strut assembly (15, figure 4–27) consists of an oleo assembly with a universal assembly installed on each end. The upper end of the shock strut assembly is attached to a fitting in the aft fuselage section (tail cone) with the lower end attached to lugs on the aft end of the yoke and fork assembly (19). Access to the upper end of the shock strut assembly is gained through the aft fuselage section (tail cone). The shock strut assembly cushions the shock when landing and taxiing.

a. Removal. (1) Jack helicopter in accordance with paragraph 1–48*c*.

(2) Deflate shock strut assembly (15, figure 4–27) in accordance with instructions on nameplate and paragraph 4–74*a*(3).

(3) Disconnect air hose (6) from elbow (7), in shock strut assembly, from inside of aft fuselage section (tail cone).

(4) Remove bolt, washers, and nut (9) securing upper end of shock strut assembly (15) on fitting in aft fuselage section (tail cone). Remove upper end of shock strut assembly from fitting and remove bushing (8).

(5) Disconnect chain from tab on boot (12).

(6) Remove bolt, washers, and nut (31) securing lower end of shock strut assembly (15) in lugs on aft end of yoke and fork assembly (19). Remove shock strut assembly from aft fuselage section (tail cone) and remove bushing (30) from lower end of shock strut assembly.

(7) Remove screws, washers, and nuts (11 and 13) securing clamps (10 and 14) on boot (12). Remove clamps and boot.

(8) Remove elbow (7), nut (18), washer (17), and packing (16) from upper end of shock strut assembly (15) and plug opening to prevent hydraulic fluid from draining out.

b. Cleaning. (1) Clean oleo assembly of shock strut assembly with a cloth soaked in hydraulic fluid (item 3, table 1–8).

(2) Clean universal assemblies with solvent (item 4, table 1–8) and dry with filtered compressed air.

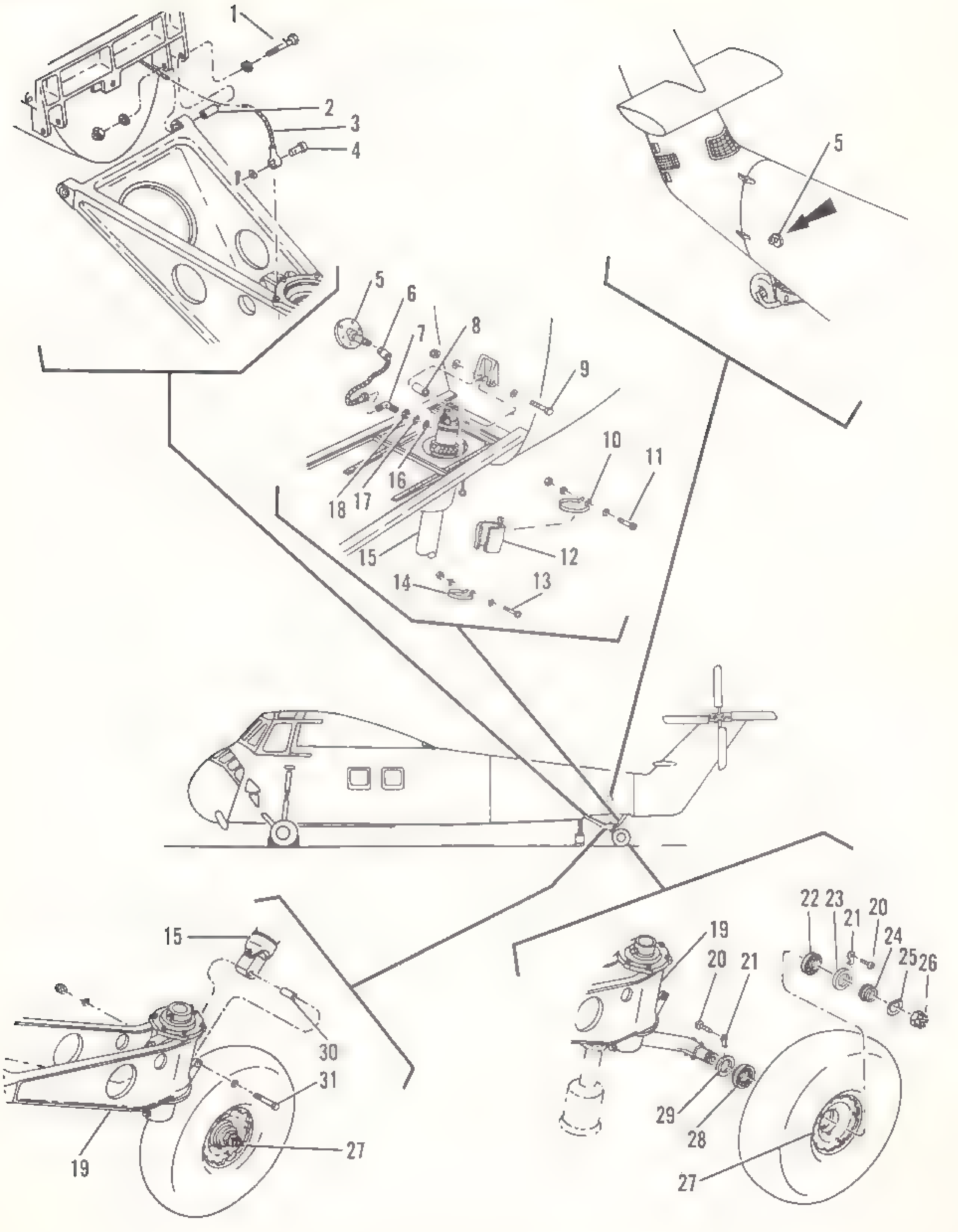


Figure 4—27. Tail landing gear assembly installation (Sheet 1 of 2)

1. Bolt, Washers, Nut	12. Boot	22. Bearing
2. Bushing	13. Screw, Washers, Nut	23. Retainer
3. Cable	14. Clamp	24. Spacer
4. Pin, Washer, Cotter Pin	15. Shock Strut Assembly	25. Washer
5. Air Valve	16. Packing	26. Nut
6. Air Hose	17. Washer	27. Tail Wheel Assembly
7. Elbow	18. Nut	28. Bearing
8. Bushing	19. Yoke and Fork Assembly	29. Retainer
9. Bolt, Washers, Nut	20. Screw	30. Bushing
10. Clamp	21. Clip	31. Bolt, Washers, Nut
11. Screw, Washers, Nut		

Figure 4–27. Tail landing gear assembly installation (Sheet 2 of 2)

c. Inspection. Inspect all components of shock strut assembly for cracks, dents, bends, corrosion, and elongated pivot holes.

d. Installation. (1) Fill shock strut assembly (15, figure 4–27) with hydraulic fluid (item 3, table 1–8) and install packing (16), washer (17), nut (18), and elbow (7).

(2) Position boot (12) on shock strut assembly (15) and close zipper. Position clamp (10) on upper end of boot and secure with screw, washers, and nut (11).

Note

Do not install clamp (14) on lower end of boot, as this frees lower end of boot and reduces the flexure and subsequent tearing of boot or breaking zipper.

(3) Position bushing (8) in upper end of shock strut assembly (15). Position upper end of shock strut assembly on fitting inside aft fuselage section (tail cone) and secure with bolt, washers, and nut (9).

(4) Connect air hose (6) to elbow inside of aft fuselage section (tail cone)

(5) Position bushing (30) in lower end of shock strut assembly (15). Position lower end of shock strut assembly on lugs at aft end of yoke and fork assembly (19) and secure with bolt, washers, and nut (31).

(6) Connect chain to tab on boot (12).

(7) Lower jack and remove from helicopter.

(8) Inflate shock strut assembly (15) at air valve (5) on right side of fuselage in accordance with instructions on nameplate and paragraph 4–74*a*(2).

4–82. *Yoke and Fork Assembly.* The yoke and fork assembly (19, figure 4–27) supports the tail wheel assembly (27) and has two lugs on aft end to attach the shock strut assembly (15). The forward end of the yoke is attached to a fitting on the lower aft end of the aft fuselage section (tail cone). The yoke and fork assembly houses the components that allow the tail wheel assembly to swivel and the lockpin of the tail wheel lock control assembly.

a. Removal. (1) Jack helicopter in accordance with paragraph 1–48*c*.

(2) Remove nut (26, figure 4–27), washer (25), and spacer (24) and remove tail wheel assembly (27) from axle of yoke and fork assembly (19).

(3) Deflate shock strut assembly (15) at air valve (5) in accordance with paragraph 4–74*a* (3).

(4) Remove bolt, washers, and nut (31) securing lower end of shock strut assembly (15) to lugs on yoke and fork assembly (19).

(5) Remove cotter pin, pin, and washer (4) securing cable (3) to lockpin.

Note

When cable (3) is disconnected from lockpin on helicopters serial No. 57-1715 and subsequent, lockpin is free and may be drifted out.

(6) Support yoke and fork assembly (19) and remove bolts, washers, and nuts (1) securing yoke and fork assembly to fitting on aft end of aft fuselage section (tail cone).

(7) Remove yoke and fork assembly (19) and remove bushings (2).

b. Cleaning. Clean yoke and fork assembly with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. (1) Inspect yoke and fork assembly for cracks, dents, bends and corrosion.

(2) Inspect drain hole in bottom of yoke assembly for obstruction.

d. Installation. (1) Position bushings (2, figure 4–27) in aft end of yoke and fork assembly (19).

(2) Position yoke and fork assembly (19) on fitting at aft end of aft fuselage section (tail cone) and secure with bolts, washers, and nuts (1).

(3) Lift yoke and fork assembly (19) and position lower end of shock strut assembly (15) on lugs at aft end of yoke and fork assembly. Install bolt, washers, and nut (31).

(4) Connect cable (3) to lockpin with pin, washer, and cotter pin (4).

(5) Position tail wheel assembly (27) on axle of yoke and fork assembly and install spacer (24), washer (25), and nut (26).

(6) Tighten nut (26) just enough to remove end play and bend washer (25) down on nut.

(7) Lower jack and remove from helicopter.

(8) Inflate shock strut assembly (15) at air valve (5) in accordance with instructions on nameplate and paragraph 4–74*a* (2).

4–83. Tail Wheel Lock Control Assembly. The tail wheel lock control assembly (figure 4–28) consists of control handle assembly (5), bellcrank (7), lockpin (18), and cables (8 and 13). The cables are attached to the bellcrank and routed around pulleys and through fairleads to the lockpin at the yoke and fork assembly. The cables are connected by a turnbuckle (12) in the aft fuselage section(tail cone). On helicopters serial No. 54-900 and subsequent an indicator flag (17) and a link are installed as original equipment. The movement of the lockpin pulls the link which pivots the indicator flag into view above the yoke and fork assembly. The lockpin is grooved so it will shear before damaging the collar if the lockpin is not properly disengaged.

Caution

Do not tow the helicopter with the lockpin engaged, as this will shear the lockpin.

a. Removal. (1) Remove bolt, washers, and nut (3, figure 4–28) securing control handle assembly (5) to support and remove spacer (4). Remove cotter pin, pin, and washer, (6) securing control handle assembly to bellcrank (7) and remove control handle assembly.

(2) Remove cotter pin and pin (1) securing forward end of cable (8) to bellcrank (7). Remove cotter pin, bolt, washers, and nut (2) securing bellcrank to support and remove bellcrank.

(3) Remove lock wire from turnbuckle (12) and remove turnbuckle from ends of cables (8 and 13).

(4) Remove cotter pins, pins, and washers (20) from brackets (11) and brackets at pulleys (24) and remove cable (8) from pulleys and fairleads (9).

(5) Remove cotter pin, pin, and washer, securing cable (13) to lockpin (18). Remove pin (19) from bracket at pulleys (15) and remove cable (13)from pulleys and fairleads.

Note

On helicopters serial No. 54-900 and subsequent the link for the indicator flag (17) is attached to the lockpin with cable (13).

(6) Remove lockpin (18) from yoke and fork assembly, if bent or broken, as follows:

(a) Depress retainer on helicopters serial No. prior to 57-1715 with a screwdriver and remove retaining ring. Remove retainer, spring, and pull lockpin from housing. Use a drift against bottom of lockpin, if necessary.

(b) Remove lockpin on helicopters serial No. 57-1715 and subsequent by drifting it out of housing.

(7) Remove bolts and nuts (23) securing pulleys (10, 14, 16, 22, and 24) in brackets and remove pulleys and washers (21) from brackets.

(8) Remove indicator flag (17) and pulley on helicopters serial No. 54-900 and subsequent by removing bolt, washer, and nut.

b. Cleaning. Clean components of tail wheel lock control assembly with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. (1) Inspect control handle assembly and bellcrank for cracks, bends, dents, and elongated bolt holes.

(2) Inspect cables for broken wires, worn spots, and corrosion.

(3) Inspect pulleys and brackets for cracks, bends, and evidence of binding.

(4) Inspect lockpin for bends, evidence of binding, and corrosion.

d. Installation. (1) Position pulley and indicator flag (17, figure 4–28) on yoke and fork assembly on helicopters serial No. 54-900 and subsequent and secure with bolt, washer, and nut.

(2) Position pulleys (10, 14, 16, 22, and 24) and washers (21) in brackets and secure with bolt and nuts (23).

(3) Install cable (13) on pulleys (14, 15, and (16) and through fairleads (9).

(4) Install cable (8) on pulleys (10, 22, and 24) and through fairleads (9). Install pin, washer, and cotter pin (20).

(5) Connect cables (8 and 13) in aft fuselage section (tail cone) with turnbuckle (12).

(6) Position bellcrank (7) on support and secure with bolt, washers, nut, and cotter pin (2).

(7) Position forward end of cable (8) on bellcrank (7) and secure with pin and cotter pin (1).

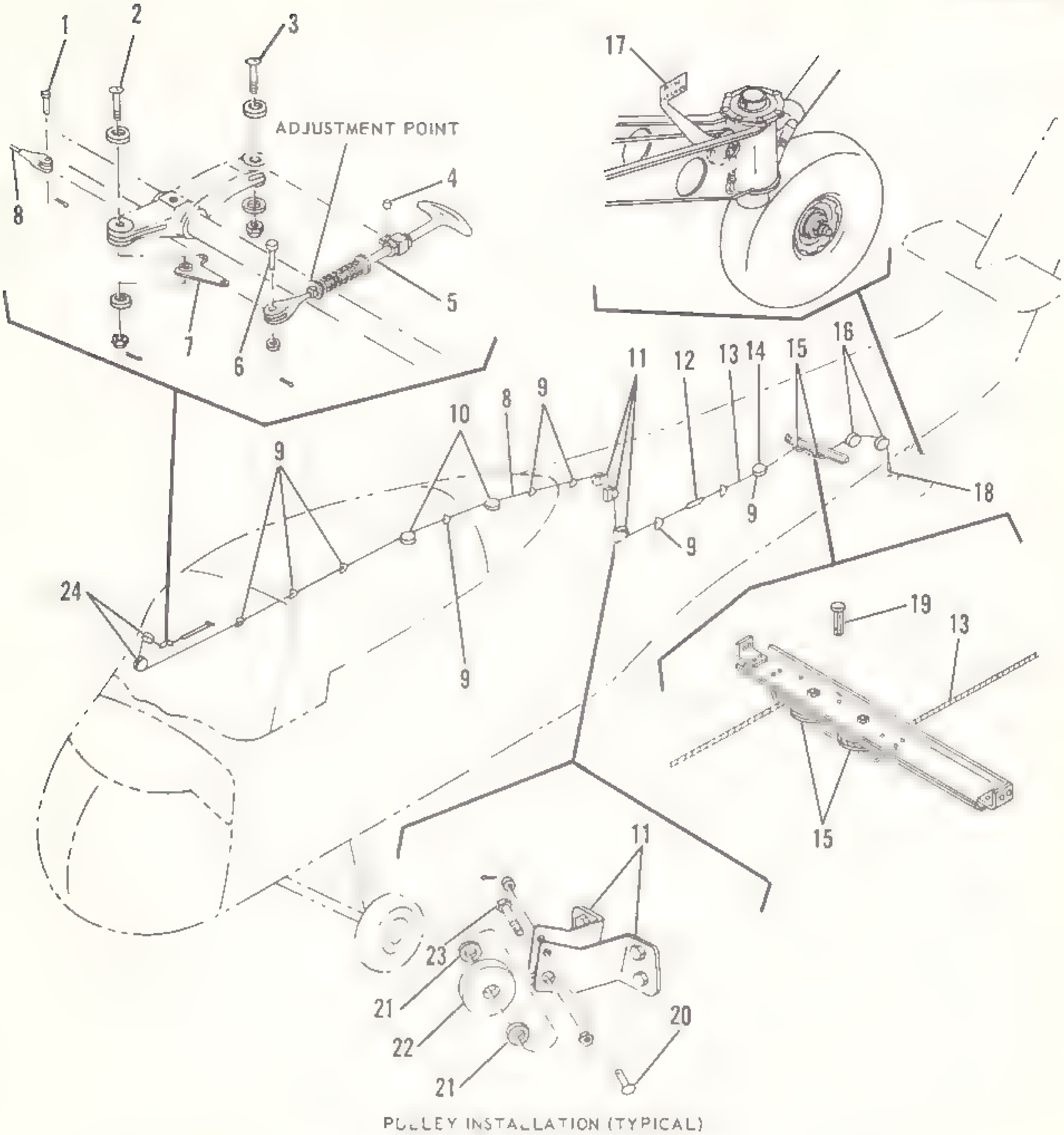
(8) Position control handle assembly (5) and spacer (4) on support and secure with bolt, washers, and nut (3). Position forward end of control handle assembly on bellcrank (7) and secure with pin, washer, and cotter pin (6).

(9) Install lockpin (18), if removed, in yoke and fork assembly as follows:

Note

Lockpin is only removed if bent or broken.

(a) Position lockpin for helicopter serial No. 57-1715 and subsequent on its housing and press into position.



1. Pin, Cotter Pin
2. Bolt, Washers, Nut, Cotter Pin
3. Bolt, Washers, Nut
4. Spacer
5. Control Handle Assembly
6. Pin, Washer, Cotter Pin
7. Bellcrank
8. Cable
9. Fairlead
10. Pulleys
11. Brackets
12. Turnbuckle
13. Cable
14. Pulley
15. Pulleys
16. Pulleys
17. Indicator Flag
18. Lockpin
19. Pin
20. Pin, Washer, Cotter Pin
21. Washer
22. Pulley
23. Bolt, Nut
24. Pulleys

Figure 4–28. Tail wheel lock control assembly

(b) Position lockpin for helicopter serial No. prior to 57-1715 in its housing and install spring and retainer. Depress retainer and install retaining ring.

(10) Position aft end of cable (13) on lockpin (18) and secure with pin, washer, and cotter pin.

Note

On helicopters serial No. 54-900 and subsequent the link for indicator flag (17) is connected to lockpin (18) at same time as cable (13).

(11) Adjust tail wheel lock control assembly in accordance with paragraph *e* below.

e. Adjustment. (1) Loosen or tighten turnbuckle (12, figure 4—28) to adjust length of cables (8 and 13) until travel of control handle assembly (5) is 1-1/2 inches and lockpin travel is 5/8 inch from locked to unlocked position.

(2) Secure turnbuckle (12) with lock wire.

CHAPTER 5

POWER PLANT AND RELATED SYSTEMS

Section I Scope

5–1. Purpose. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete power plant and related systems prescribed by the Maintenance Allocation Chart.

5–2. Description. The information contained in this chapter provides the necessary instructions for the operation, troubleshooting, removal, permissible repair, conditioning, testing, and installation of component parts of the power plant, accessories, and related systems.

Section II Power Plant

5–3. Description. This section consists of the power plant and the following basic components: cylinder and piston assembly, rocker box covers, pushrods and pushrod housings, intake pipes, supercharger drain valve, baffles and deflectors, main thrust nut and oil seal, front oil sump, and engine mount assembly.

5–4. Power Plant. A Wright Model R1820-84A or R1820-84C nine-cylinder, air-cooled, single-row radial engine is installed in Models CH-34A and CH-34C helicopters. (See figures 5–1, 5–2, and 5–3.) The engine is equipped with a single-stage, single-speed supercharger and a direct-drive propeller shaft. The engine is installed facing aft with the propeller shaft approximately 35 degrees above horizontal. The engine is supported by an engine mount which is bolted to the forward bulkhead of the fuselage bottom structure. A hydro-mechanical clutch is splined to the propeller shaft. For engine specifications, refer to table 5–1.

5–5. Cleaning. Clean installed engine in accordance with paragraph 1–65.

5–6. Inspection. a. Inspect engine inlet lines for security of attachment to the following coupling halves located on the left accessory compartment shroud panel assembly:

(1) Hydraulic pump inlet.

(2) Hydraulic pump bypass.

(3) Oil pressure.

(4) Vapor return.

(5) Manifold pressure.

(6) Fuel pressure.

(7) Hydraulic pump outlet.

(8) Fuel pump inlet.

b. Inspect for security of attachment of all accessories mounted on supercharger rear housing.

c. Inspect all applicable components for proper lockwiring.

d. Inspect all lines and bosses for security of attachment and evidence of leakage.

e. Inspect exhaust collector assembly for condition and security of attachment.

f. Inspect electrical system for evidence of arcing at connections.

g. Inspect shroud panel assembly for evidence of damage.

5–7. Preoiling Engine. *a.* Accomplish preoiling under the following conditions:

(1) Prior to starting a new or newly overhauled engine for the first time.

(2) Prior to starting an engine which has been standing idle for more than 72 hours.

(3) After an oil change.

(4) In event oil inlet line is replaced or tampered with in any manner that would allow oil to drain out of line or allow air to enter.

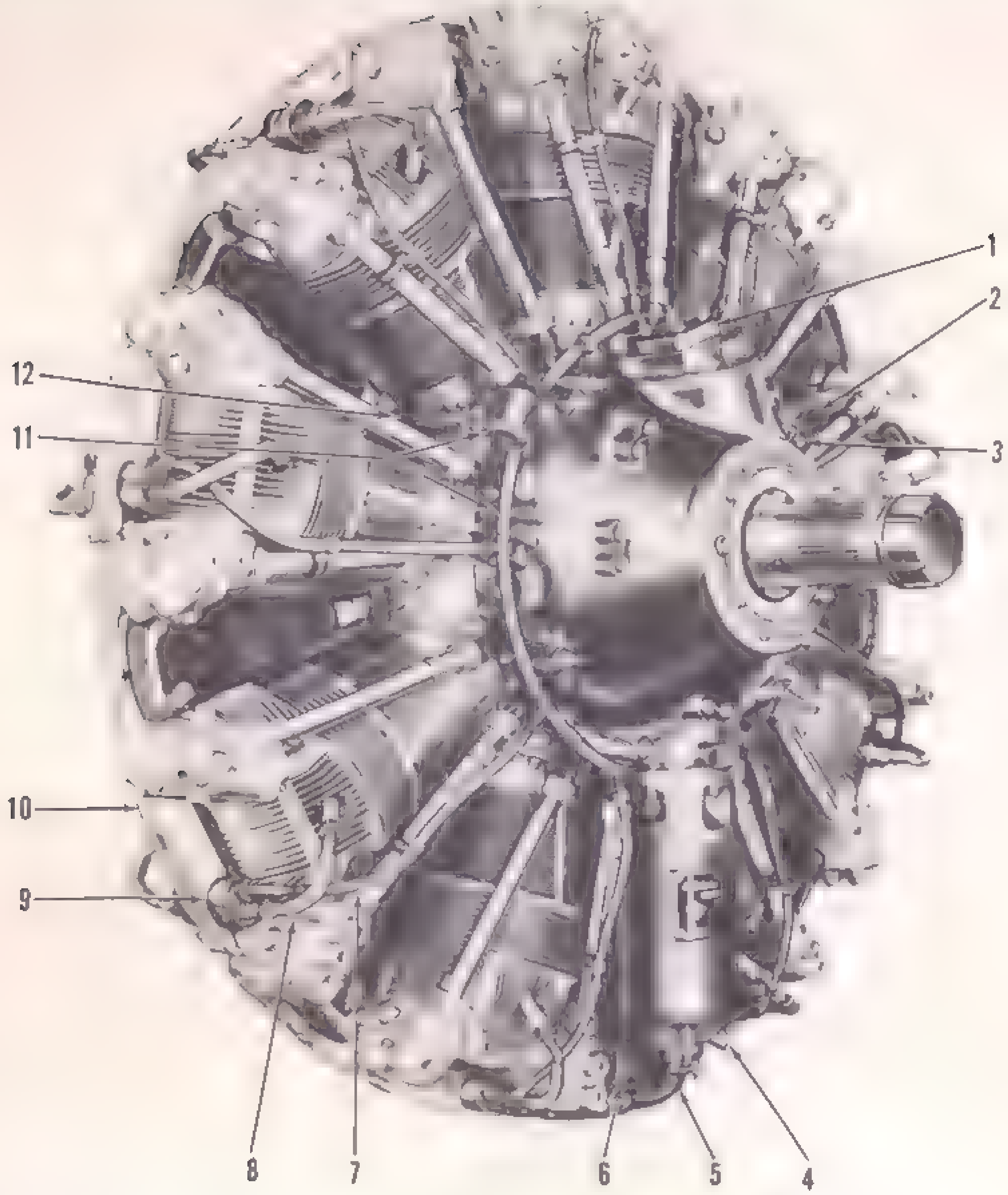
b. Utilize a preoiler incorporating the following features:

(1) Volume of reservoir – 15 gallons (minimum).

(2) Fitted with a pump capable of delivering 10 gallons per minute at 55 to 65 psi.

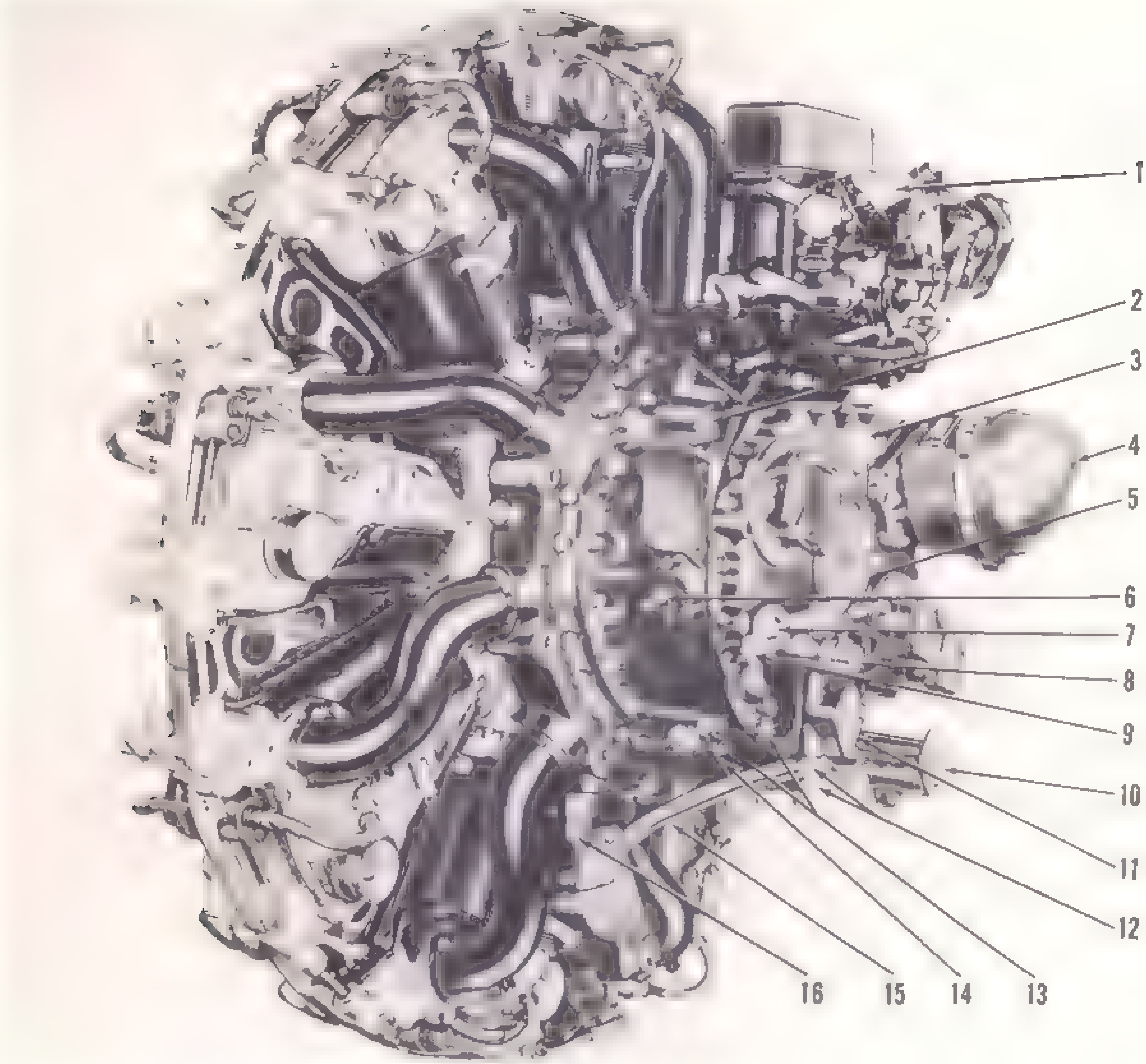
Table 5–1. R1820-84 engine specifications

BASIC DATA	
Series	R1820-84
Type	Single-Row, Radial, Reciprocating, Piston
Number of Cylinders	9
Bore	6.125 in.
Stroke	6.875 in.
Displacement	1820 cu. in.
Compression Ratio	6.80:1
Impeller Diameter	11.4 in.
Rotation of Crankshaft	(From Rear) Clockwise
Rotation of Propeller Shaft	(From Rear) Clockwise
Propeller Gear Ratio	1:1
Propeller Shaft Spline	No. 51
Impeller Gear Ratio	7.21:1
Installation in Airframe	35°
DIMENSIONS	
Overall Diameter	55.74 in.
Overall Length	52.00 in.
WEIGHTS	
Total Dry Weight of Engine	Maximum 1405 lb
Total Weight Packed for Shipment	Maximum 3000 lb
LUBRICATION SYSTEM	
Oil Specification	MIL-L-6082, Grade 1100
Oil Pressure (at rear pump)	70 ± 5 psi
Oil Pressure (at nose) Minimum	24 psi
VALVES AND TIMING	
Intake Opens	40° B.T.D.C.
Intake Closes	49° A.B.D.C.
Exhaust Opens	69° B.B.D.C.
Exhaust Closes	30° A.T.D.C.
Valve Rocker Clearance	
Set for Timing Check	0.079 in.
Set for Operation	0.010 in.
IGNITION SYSTEM	
Type	Low Tension
Magneto	Scintilla D9LN-3
Ignition Harness	Scintilla 10-89385-1
Spark Plug Type	RB39R
Spark Plug Gap	0.015 to 0.018 in.
Spark Advance	All Plugs 25° B.T.D.C.
FUEL SYSTEM	
Carburetor	Bendix PD-12R1
Fuel Specification	MIL-G-5572, Grade 115/145
Fuel Pressure Range	21-25 psi
CYLINDER HEAD TEMPERATURES	
Ground Operation (Maximum)	260°C (500°F)
Normal Rated Power to 70% Normal Rated	245°C (473°F)
Below 70% Normal Rated Power	230°C (446°F)



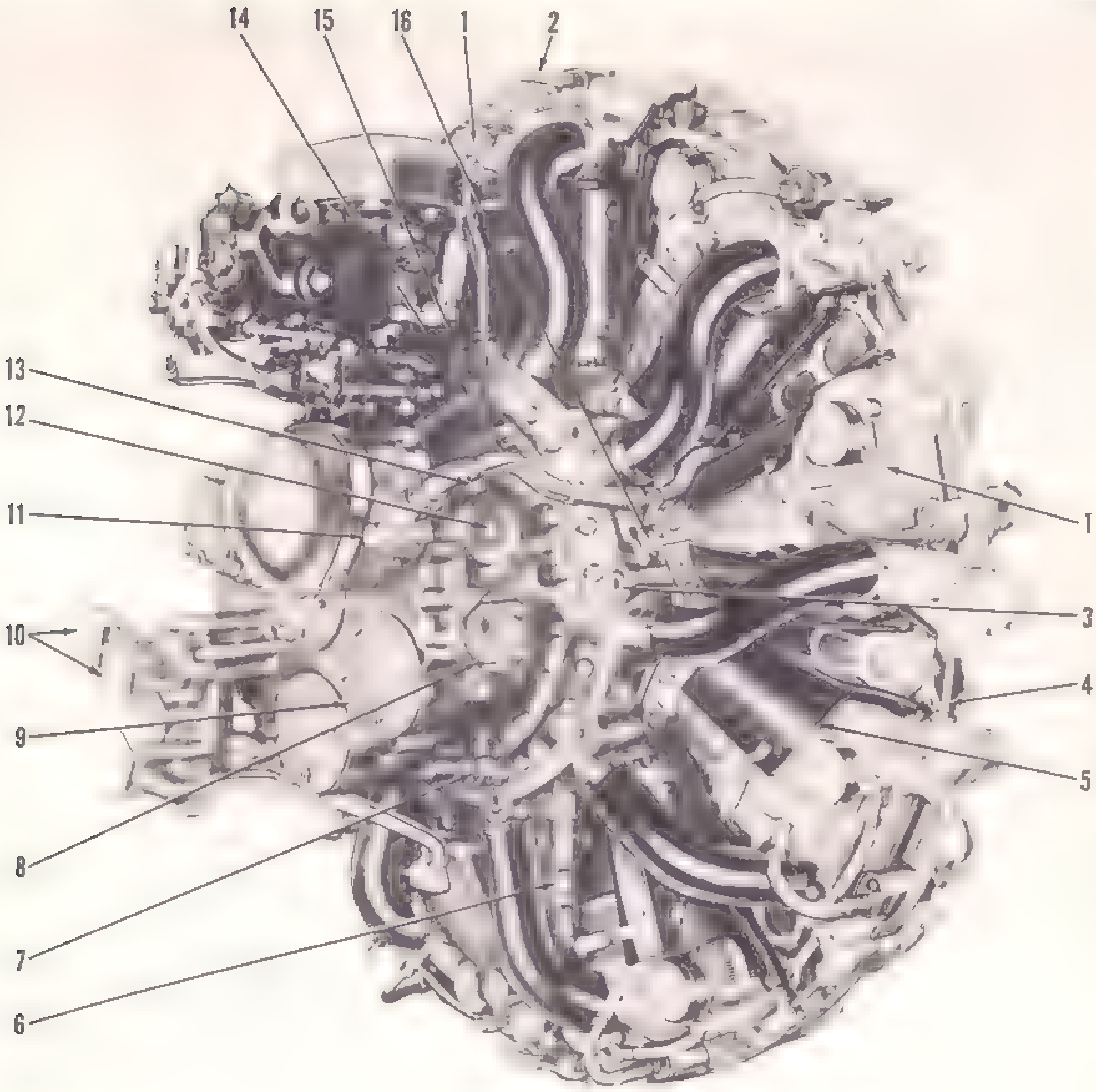
1. Oil Separator Spinner Substituting Cover
2. Oil Tank Vent
3. Anticorrosion Injection Fitting
4. Rocker Box Sump Vent Tube
5. Rocker Box Sump-to-Front Pump Scavenge Tube
6. Rocker Box Sump
7. Low-Tension Ignition Lead
8. Front Spark Plug Lead
9. Transformer Coil
10. Cowl Seal Channel Assembly
11. Ignition Cable Manifold and Junction Box
12. Magneto-to-Ignition Manifold Conduit

Figure 5—1. Three-quarter right front view, model R1820-84 engine



1. Carburetor
2. Oil Return For Accessory
3. Oil Pressure Transmitter
4. Magneto
5. Accessory Substituting Cover
6. Pressure Oil Strainer
7. Oil Pump Check Valve
8. Pressure Relief Valve
9. Preoiling Connection
10. Oil Outlet
11. Oil Inlet
12. Oil Temperature Gage
13. Oil Supply Passage Plugs
14. Supercharger Rear Housing Chip Detector Plug and Strainer Assembly
15. Scavenge Oil Tube
16. Internal Oil Supply Passage Plug

Figure 5—2. Three-quarter left rear view, model R1820-84 engine



1. Rocker Box Lubricating Tube
2. Rear Spark Plug Lead
3. Engine Mount Hole
4. Rocker Box Drain Tube
5. Cylinder Air Deflector
6. Accessory Oil Return Drain Plug
7. Supercharger Drain Valve
8. Fuel Pump Substituting Cover
9. Accessory Drive Substituting Cover
10. Tachometer Substituting Covers
11. Ignition Switch and Booster Connection
12. Oil Tank Vent
13. Crankcase Breather
14. Magneto -to-Ignition Manifold Conduit
15. Crankcase Breather
16. Magneto -to-Ignition Manifold Conduit Bracket

Figure 5-3. Three-quarter right rear view, model R1820-84 engine

(3) A 10-micron oil filter.

(4) A temperature control range of 38° to 121°C (100° to 250°F). Oil should be 71° to 104°C (160° to 220°F) during preoiling.

c. Preoil engine as follows:

(1) Fill oil tanks with lubricating oil (item 2, table 1–8), Grade 1100. (Refer to table 1–5.)

(2) Remove one spark plug from each cylinder.

(3) Remove magnetic chip detector plugs from front oil sump and supercharger rear housing.

(4) On new or newly overhauled engines, remove, clean, and install main engine oil inlet strainer.

(5) If experience indicates a delay in obtaining oil pressure response, bleed and fill oil pressure line between engine and pressure gage or transmitter with oil. Use lubricating oil (item 2, table 1–8), Grade 1010, in line during cold weather operation.

(6) Remove preoil plug on engine oil pump housing.

Caution

Before continuing with preoiling procedures, insure that the oil inlet check valve spring has been removed.

(7) Connect preoiler to fitting and pump oil, preheated to 71° to 104°C (160° to 220°F), into engine until 2 to 3 gallons of oil are drained from engine oil sump and oil pressure indication is obtained on main oil pressure gage. Secure preoiler and remove preoil line. Do not install plug at this time.

(8) Remove cap from preoil fitting located just downstream of aircraft swing check valve at system Y-drain in engine oil-in line, and connect preoiler.

(9) Pump oil, preheated to 71° to 104°C (160° to 220°F), into oil-in line and simultaneously crank engine until air-free oil is discharged from preoil fitting. Stop preoiler, disconnect preoiler, and quickly install cap to prevent air from entering; secure with lock wire.

Caution

Be sure that ignition switch is OFF and mixture control is in IDLE CUT-OFF position. Do not crank engine with starter for longer than 20-to 30-second periods.

(10) Reconnect preoiler to preoil fitting on oil pump housing and restart preoiler. Watch for oil pressure indication on main engine pressure gage. When pressure is noted, crank engine with starter until 4 additional gallons of oil are pumped through engine and drain from oil sump.

(11) Permit residual oil to drain from oil sump and supercharger housing; install magnetic chip detector plugs and spark plugs; disconnect preoiler; and quickly install preoil plug (to prevent oil from draining) and secure with lock wire.

(12) Refill oil tank to specified capacity. (Refer to table 1–5.)

(13) Start engine as soon as possible after preoiling in accordance with approved starting procedures. (Refer to TM 55-1520-202-10.)

Caution

During normal operating conditions, do not turn ignition on until oil pressure is noted during cranking procedure. Insure that all depreservation precautions are observed in the case of new or newly overhauled engine installations.

d. To preclude possibility of oil starvation when helicopter has been subjected to low temperatures which results in oil tank congealing, it is recommended that sufficient preheat be applied to the installation to permit free flowing of oil to engine oil pump.

e. When an oil-in strainer is removed for cleaning or inspection during conditions not normally requiring preoiling, observe the following precautions:

(1) Remove strainer assembly and immediately replace with a clean assembly before engine oil inlet temperature drops below 40°C (104°F).

(2) Before oil temperature drops below 40°C (104°F), turn engine through with starter (ignition switch OFF) until oil pressure indication is noted. If oil pressure is not indicated in 20 to 30 seconds, allow starter to cool and repeat cranking procedure.

5–8. Cylinder and Piston Assembly. The nine cylinder and piston assemblies work in conjunction to provide a space for combustion to take place and a means for compressing the fuel-air mixture prior to firing of spark plugs. The cylinders protrude perpendicular to the crankcase and are air-cooled by means of ram air provided by the engine fan.

5–9. Cleaning. a. Clean cylinder with solvent (item 4, table 1–8).

b. Blow cylinder dry with compressed air.

5–10. Inspection. a. Inspect all cylinder barrel skirts for dents or cracks.

b. Inspect all cylinders for cracked or otherwise damaged head fins.

c. Inspect cylinder holddown capscrews for security of lock wire.

d. Inspect cylinder holddown flange for cracks.

5–11. Testing. Cylinder compression check will be accomplished at the inspection period nearest to each 200 hours of operation or at any time faulty compression is suspected. Cylinders with compression falling 10 psi below minimum pressure will be replaced.

a. Operational check of cylinder compression tester, Type MK-1. The Type MK-1 cylinder compression tester (figure 5—4) performs a dynamic compression check of each individual cylinder. The cylinder pressures are averaged and any cylinders having abnormally low compression must be removed. This prevents the engine being operated with a large variation of compression between individual cylinders. As this is a dynamic check, erratic valve clearances will affect the compression reading obtained. To assure the most effective test of compression and, at the same time, eliminate the possibility of removing cylinders which are not defective, the cylinder compression tester should be checked for accuracy prior to accomplishing a compression check of the engine. Testers which do not meet the requirements shall be returned to overhaul for repair.

(1) Attach cylinder compression tester to a source of compressed air known to be accurately gaged as to pressure output. Check cylinder compression tester under operating air pressure (80 to 100 psi).

(2) Transfer air pressure from known gaged source to cylinder compression tester. If compression tester has an error of 5 percent or more, adjust or replace cylinder compression tester as required.

Warning

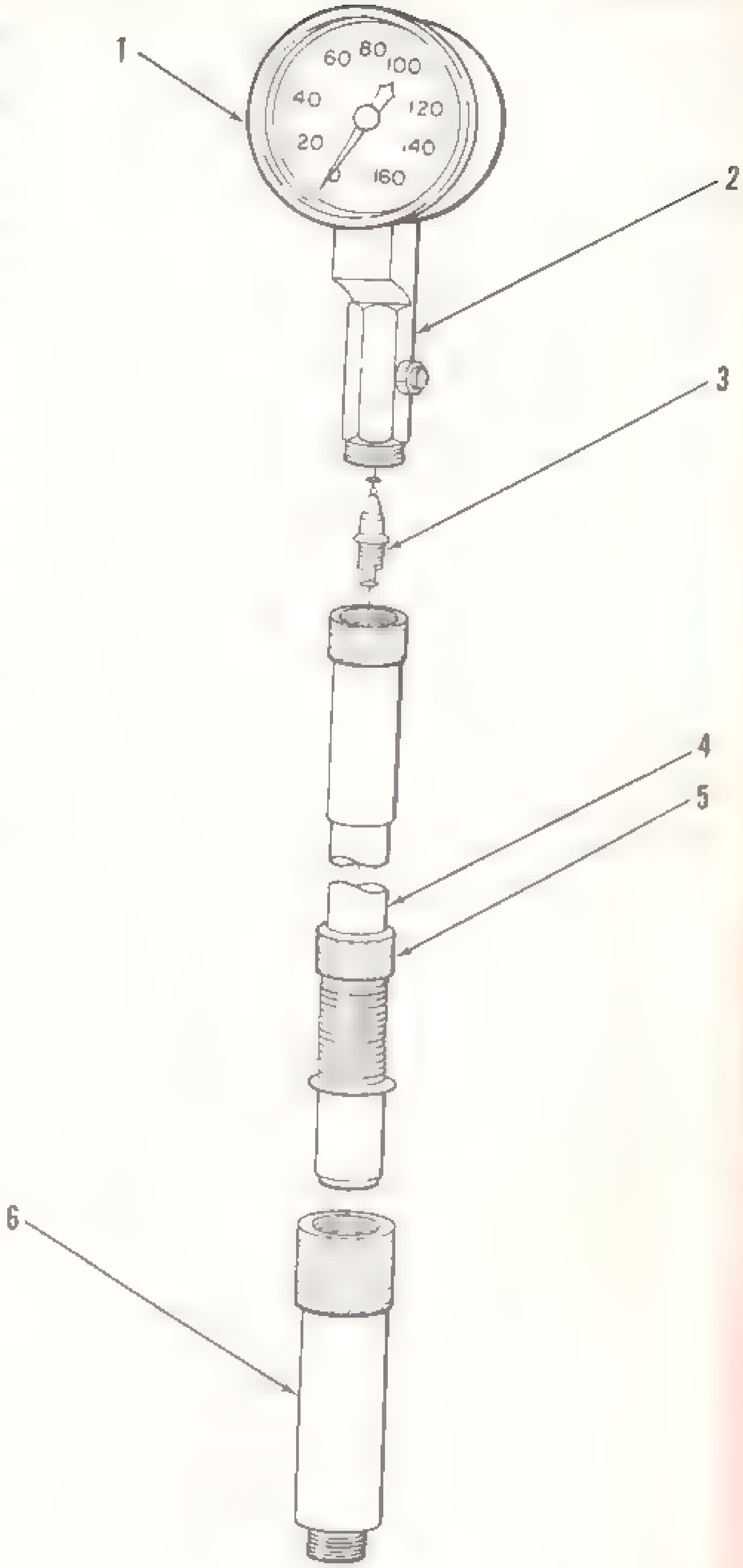
Before disconnecting cylinder compression tester from source of compressed air, insure pressure is shut off, and then press pressure relief button on cylinder compression tester to relieve all pressure.

b. Compression check using cylinder compression tester, type MK-1. (1) Start engine in accordance with TM 55-1520-202-10, and warm up in order that all piston rings, cylinder walls, etc, will be uniformly lubricated.

(2) Remove rear spark plug from each cylinder. (Refer to paragraph 5—176.)

(3) Install cylinder compression tester in rear spark plug insert of each cylinder and tighten fingertight or enough to effect a firm seal. To install cylinder compression tester, loosen small knurled sleeve (5, figure 5—4) three to four turns until assembly is free. Screw spark plug adapter body section (6) into spark plug bushing until rubber gasket is firmly seated. Maneuver flexible hose assembly until gage is visible to operator. Tighten small knurled sleeve to seal hose section inside body section.

(4) Turn engine over in direction of rotation by hand until piston in cylinder No. 1 is coming up on compression stroke; continue turning slowly until piston reaches top dead center. If engine is rotated too far, back up at least one-half revolution and start over again to eliminate effect of backlash in valve operating mechanism and to keep piston rings seated on lower ring lands.



1. Gage
2. Relief Valve
3. Check Valve
4. Flexible Hose
5. Small Knurled Sleeve
6. Spark Plug Adapter Body Section

Figure 5—4. Cylinder compression tester, type MK-1

(5) Record compression reading of each cylinder.

(6) When low compression is obtained on cylinders, install rear spark plugs (paragraph 5—179), start engine, run up to power check rpm, and operate for a minimum of 3 minutes. As soon as engine is shut down, recheck cylinder or cylinders having low compression.

(7) If this does not correct difficulty, remove rocker box cover and check valve clearance to determine if low compression is due to negative valve clearance.

(8) If not caused by negative valve clearance, strike valve by placing fiber drift on rocker arm immediately over valve stem and tapping drift several times with a 1- to 2-pound hammer. Then rotate engine and recheck compression.

Caution

When striking valves, rotate propeller shaft so that piston will not be on top dead center, to prevent possibility of valve striking head of piston.

(9) Service Record for Aircraft, DA Form 2408-15, will be used for recording compression reading on 1 cylinder. This form, with compression values ained, will be attached to component Installation nd Removal Record, DA Form 2408-16, and kept with engine.

5—12. Rocker Box Covers. Each cylinder assembly has two rocker box covers to shield the entrance of foreign material into the rocker arm assembly and to keep oil in the rocker box lubricating system from being expelled. The rocker box covers are aluminum castings.

Note

Due to the rocker box drain system, all rocker box covers are not removed in the same manner. The following rocker box covers are removed in pairs: cylinder No. 2 intake with No. 3 exhaust, No. 3 intake with No. 4 exhaust, No. 4 intake with No. 5 exhaust, No. 6 intake with No. 7 exhaust, No. 7 intake with No. 8 exhaust, and No. 8 intake with No. 9 exhaust. The remaining rocker box covers are removed individually: Cylinder No. 1 intake and exhaust, No. 2 and 6 exhaust, No. 5 intake which is integral with the rocker box drain sump, and No. 9 intake. Although cylinder No. 5 intake and No. 6 exhaust are connected by a flexible drain tube, they are not removed in pairs because of possible damage to the drain tube.

-13. *Removal. a.* Remove lock wire and back out cker box drain sump vent tube connector nuts as own in figure 5—5.

Figure 5—5. Removing rocker box drain sump vent tube connector nut

b. Remove bolts and washers from elbow fittings which attach flexible scavenge tube to rocker box drain sump and front oil sump bodies. (See figure 5—6.)

c. Loosen rocker box drain sump to cylinder No. 6 drain tube connector nuts as shown in figure 5—7. Remove drain tube and attaching parts. Discard packing assemblies.

d. Remove rocker box cover attaching nuts as shown in figure 5—8 and washers as shown in figure 5—9 from intake side of cylinder No. 5. To prevent damage to attaching studs, insure that no washers remain on covers during removal.

e. Remove screws from rocker box support which is located on rear of oil sump.

f. Remove rocker box drain sump-to-front oil sump scavenge tube, utilizing the play offered by loosened rocker box cover to dislodge packings. Discard packings. Remove cylinder No. 5 intake rocker box cover.

g. Remove rocker box covers individually except cylinder No. 6 exhaust. This rocker box must be removed after oil sump reflector has been removed.

Figure 5—6. Removing rocker box drain sump scavenge tube connector nut

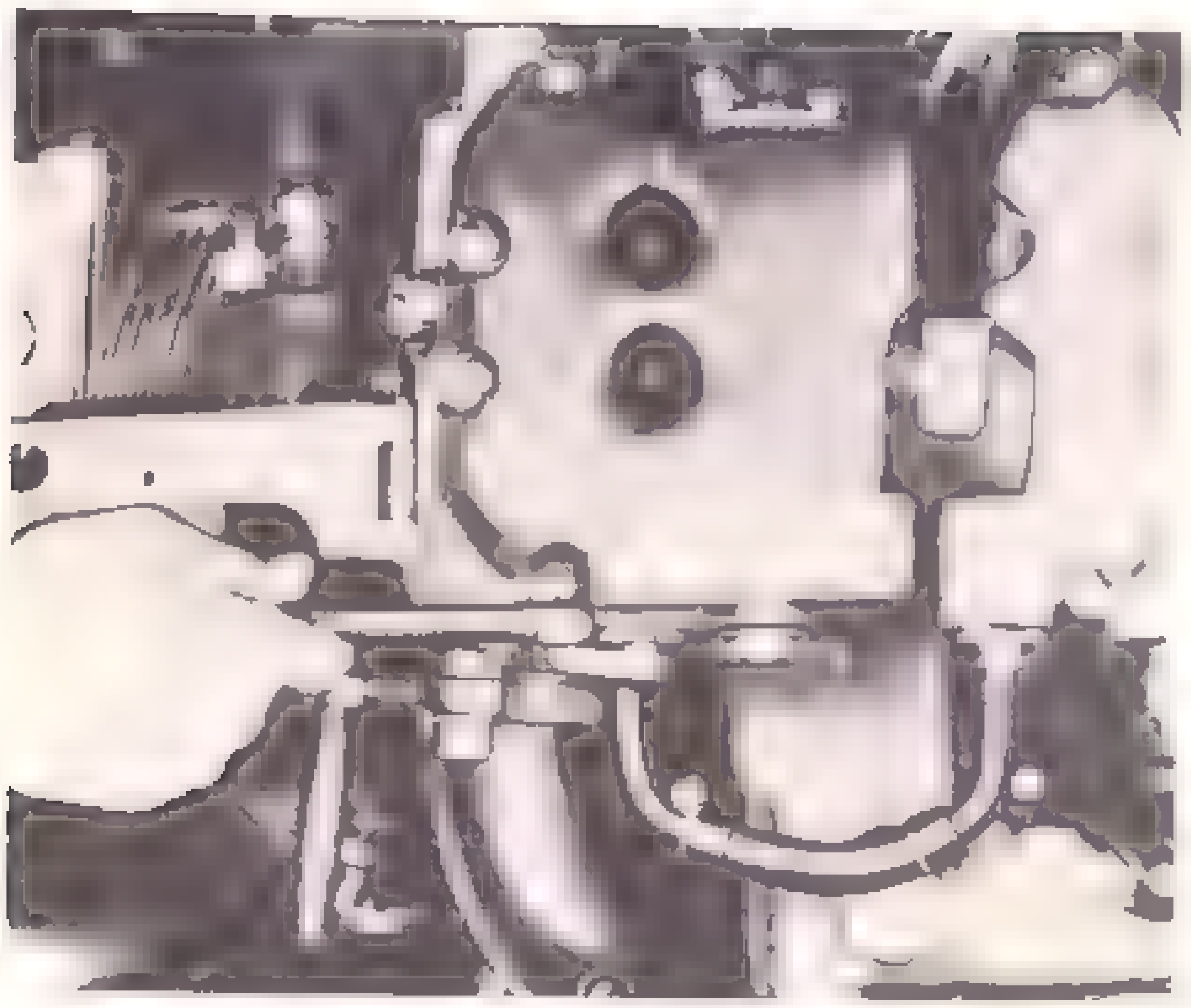


Figure 5–7. Loosening rocker box drain sump-to-front pump drain tube connector nut

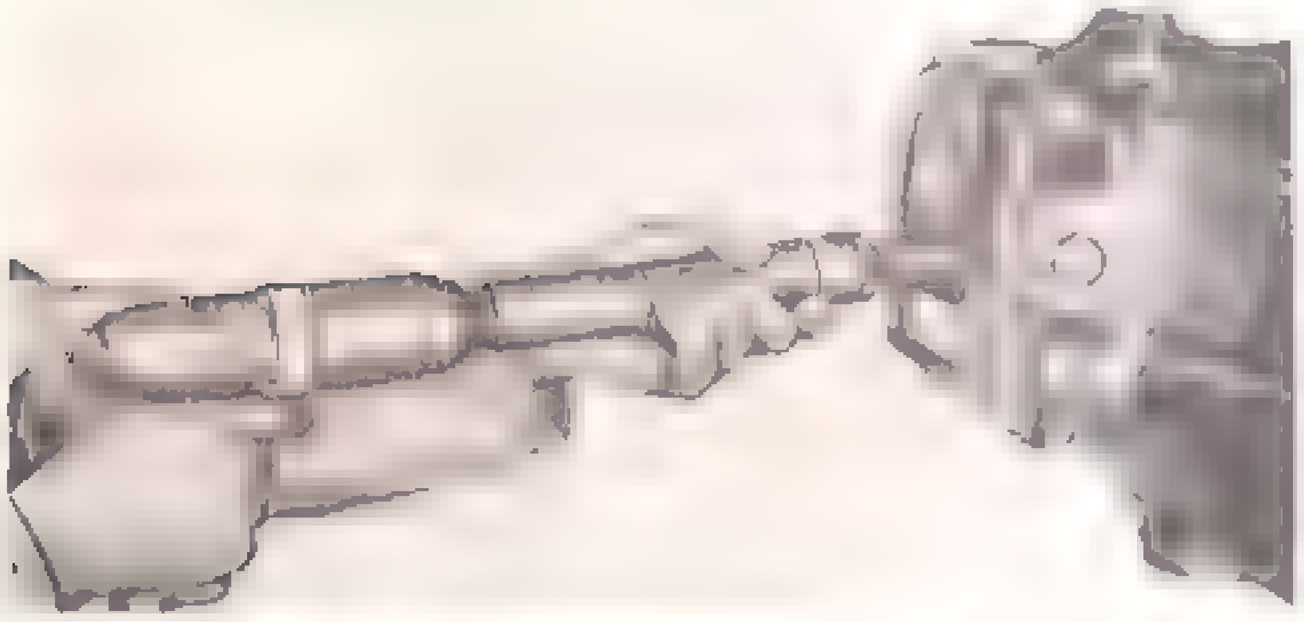


Figure 5–8. Removing rocker box cover nuts

h. Remove lock wire, and remove capscrews and washers securing oil sump deflector to cylinders No. 5 and 6. (See figure 5–10.) Remove deflector.

i. Remove lock wire and back out drain tube connector nuts on all paired rocker box covers. Remove rocker box attaching nuts and washers as prescribed in step *d* above. Remove rocker box covers, utilizing play offered by loosened drain tube nuts to avoid damaging rocker box studs. (See figure 5–11.) Discard gaskets and detach covers and tubes.

5–14. Cleaning. a. Clean rocker box covers with solvent (item 4, table 1–8).

b. Clean all traces of rocker box cover gasket from cylinder and rocker box cover.

5–15. Inspection. a. Inspect rocker box cover for warpage by placing on a flat surface. If warpage is indicated, replace rocker box cover.

b. Inspect rocker box drain tube for cracks, dents, and distortion.

c. On those rocker box covers removed as pairs, inspect connector nuts for evidence of leakage, looseness, and security of lock wire.

Figure 5–9. Removing washers from rocker box cover studs

5–16. Installation. a. Before installing rocker box cover(s), lubricate valve mechanism with lubricating oil (item 61, table 1–8).

Note

Due to the rocker box drain system, rocker box covers are installed individually and in pairs as follows: cylinder No. 1 intake and exhaust, No. 2 and 6 exhaust, and No. 5 and 9 are installed individually. No. 5 intake is integral with the rocker box drain sump. The following rocker box covers are connected by drain tubes and are installed in pairs: cylinder No. 2 intake with No. 3 exhaust, No. 3 intake with No. 4 exhaust, No. 4 intake with No. 5 exhaust, No. 6 intake with No. 7 exhaust, No. 7 intake with No. 8 exhaust, and No. 8 intake with No. 9 exhaust.

b. Install individual rocker box covers as follows:

(1) Install new gaskets over rocker box attaching studs on cylinder.

(2) Install rocker box covers over gaskets and install washers and nuts.

(3) Tighten nuts evenly, tightening first two inside nuts that are opposite each other, then remaining inside nuts, and lastly end nuts. Tighten all nuts to a torque of 15 inch-pounds.

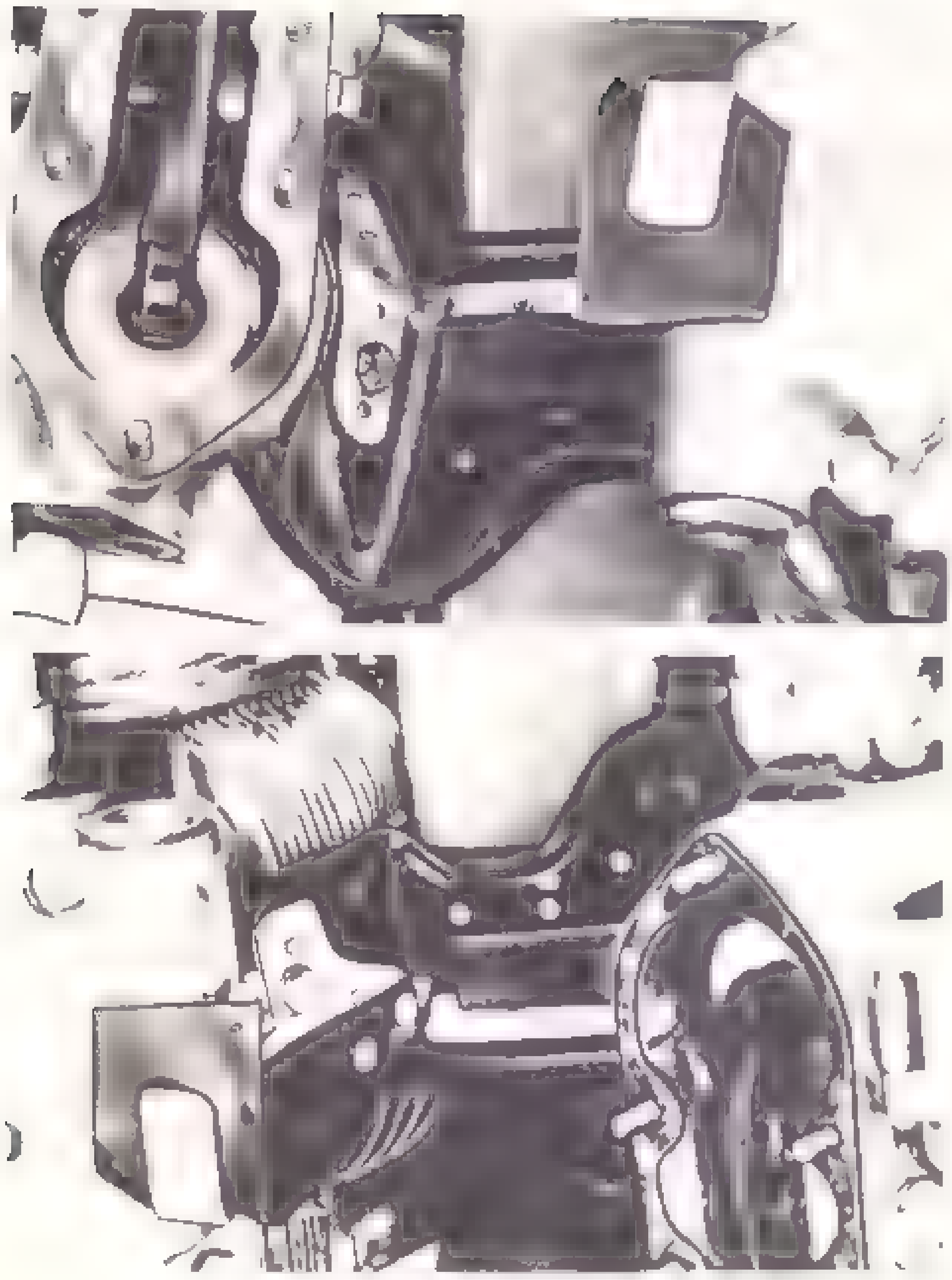


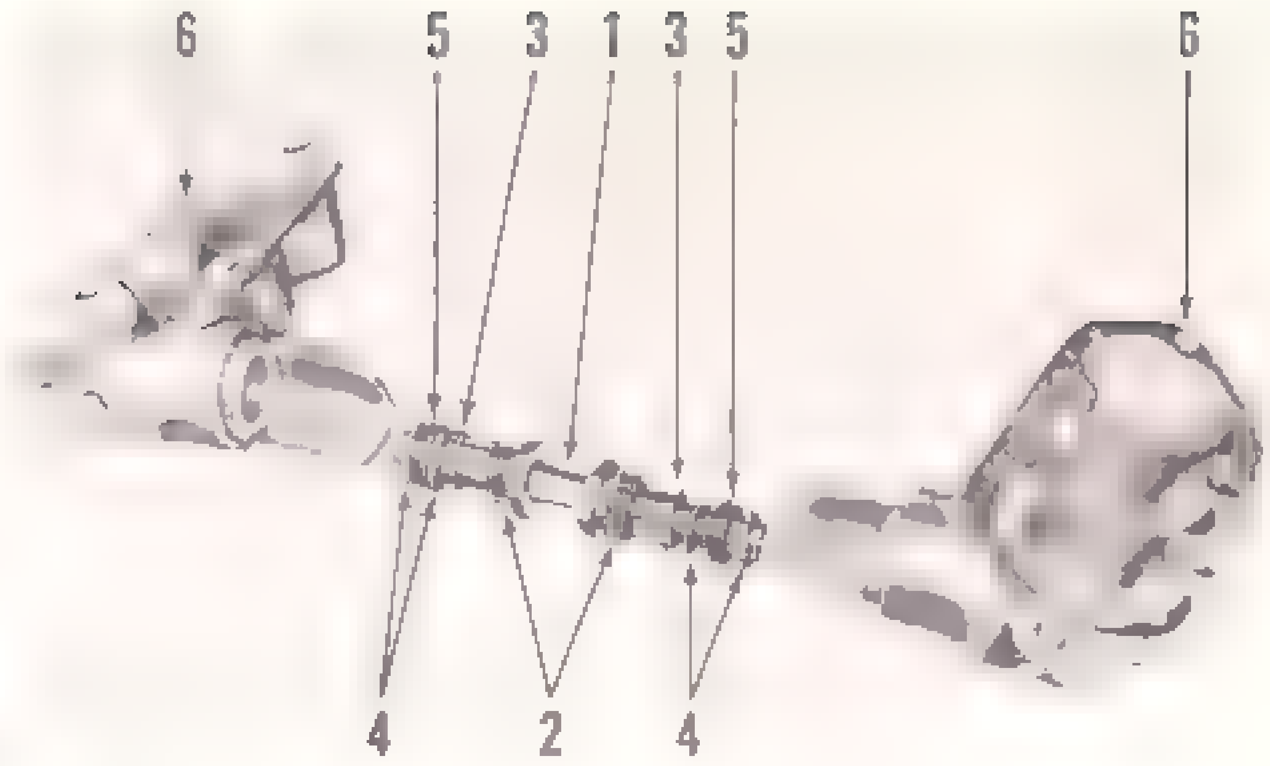
Figure 5–10. Intercylinder air deflector at oil sump location

Figure 5–11. Removing rocker box covers in pairs

c. Install rocker box covers in pairs as follows:

(1) Install new packings (5, figure 5–12) and slide attaching parts onto rocker box drain tube (1).

(2) Install each end of rocker box drain tube (1) in a rocker box cover connection, so that flared ends of tube will point toward oil sump location when rocker box covers are installed. Start each connector nut (2).



1. Rocker Box Drain Tube
2. Connector Nut
3. Gland
4. Washer
5. Packing
6. Rocker Box Cover

Figure 5–12. Rocker box drain tube assembly

(3) Lubricate valve mechanisms with lubricating oil (item 61, table 1–8), and install new gaskets over rocker box attaching studs on cylinder.

(4) Simultaneously position both rocker box covers over attaching studs on cylinders as shown in figure 5–13. Install washers and nuts.

(5) Tighten nuts evenly. Tighten first two inside nuts that are opposite each other, then remaining inside nuts, and lastly, the end nuts. Tighten all nuts to a torque of 15 inch-pounds.

(6) Tighten connector nuts (2, figure 5–12) to a torque of 25 inch-pounds. Secure connector nuts with lock wire.

d. Position rocker box drain sump support over cylinder No. 5 and oil sump, and secure with attaching washers and screws.

Figure 5–13. Installing rocker box covers in pairs

e. Slip a gland and a new packing assembly, in that order, over each end of rocker box drain sump vent tube assembly. Position assembly to connect front oil sump and rocker box drain sump. Run down the connector nuts. Tighten nuts to a torque of 25 to 35 inch-pounds and secure with lock wire.

f. Position rocker box drain sump to front oil sump scavenge tube assembly, and secure flanges with attaching washers and screws.

g. Using a new packing ring, install rocker box drain sump strainer assembly. Tighten with suitable wrench.

h. Using new packing assemblies, slide attaching parts on flexible drain tube assembly. Locate one end of tube in rocker box drain sump connection and other end in cylinder No. 6 exhaust rocker box cover. Tighten connection with a suitable wrench. Tighten nuts to a torque of 40 to 50 inch-pounds and secure with lock wire.

5–17. Pushrods and Pushrod Housings. The pushrods are actuated by the engine cam which dictates, by means of the pushrods, which valves are to be opened or closed at a prescribed time. The pushrods are actuated by the engine cam in a predetermined sequence to mobilize the rocker arms which regulate opening and closing of the valves in accordance with piston stroke. The cylindrically shaped pushrod housings encircle pushrods for purposes of protecting pushrods from damage and acting as a means of routing oil from pushrods.

5–18. Cleaning. a. Clean pushrod housings with solvent (item 4, table 1–8).

b. Wipe each pushrod housing dry using a clean, lint-free cloth.

5–19. Inspection. a. Inspect pushrod housings for evidence of leakage.

b. Inspect pushrod housings for cracks and dents; inspect holddown nuts for cracks, distortion, and security of lock wire.

5–20. Intake Pipes. The engine intake pipes are mounted between the cylinder heads and front supercharger housing studding assembly. They are used to direct fuel-air mixture from the supercharger to the intake valve of cylinder heads.

5–21. Cleaning. a. Clean intake pipes with a cloth moistened with solvent (item 4, table 1–8).

b. Wipe each intake pipe dry using a clean, lint-free cloth.

5–22. Inspection. a. Inspect intake pipes for cracks, punctures, or dents.

b. Inspect intake pipe flange holddown nuts for security of attachment.

c. Inspect threaded intake pipe nut which secures intake pipe to front supercharger housing studded assembly for security of attachment.

d. Inspect intake drain lines for distortion and security of attachment.

5–23. Supercharger Drain Valve. The supercharger drain valve allows excess fuel from the supercharger section to be drained away from the engine by means of a drain line. The supercharger drain valve is located on the right side of the supercharger rear section below the fuel pump.

5–24. Removal. a. Disconnect drain line from supercharger drain valve.

b. Place a suitable wrench on supercharger drain valve housing and remove supercharger drain valve from supercharger rear section. Discard two rubber rings located in groove in small diameter end of valve body.

c. If valve housing unscrews from valve body, leaving body in supercharger section, remove valve body with a suitable wrench, as shown in figure 5–14.

d. If supercharger drain valve comes out as a unit, hold flats, provided on valve body, in holding fixture, part No. 800523, FSN 5120-143-8116, or equivalent, and unscrew valve housing from valve body. Do not drop piston and disc assembly.

5–25. Cleaning. a. Clean supercharger drain valve with solvent (item 4, table 1–8).

b. Dry supercharger drain valve using filtered, compressed air not exceeding 15 psi.

5–26. Inspection. a. Inspect valve housing for cracks and distortion.

Figure 5–14. Removing supercharger drain valve body

b. Inspect supercharger drain valve spring for resiliency and cracks.

5–27. Installation. a. Coat two new rubber rings with antiseize compound (item 54, table 1–8) and install into groove on small diameter end of valve body.

b. Install washer on flange of valve body and install supercharger drain valve into supercharger rear section. Tighten with a suitable wrench.

c. Connect drain line to supercharger drain valve.

d. Secure supercharger drain valve with lock wire.

5–28. Baffles and Deflectors. The cylinder air deflectors (figure 5–15) are metal baffles shaped to direct cooling ram air through fins on the cylinder. With the exception of deflectors located on cylinder No. 5 intake and No. 6 exhaust positions, all deflectors on intake and exhaust sides of the cylinders are similar. The deflectors between cylinders No. 2 and 3 accommodate magneto-to-ignition manifold conduit. The deflector between cylinders No. 5 and 6 is designed to fit the contour of the rocker box drain sump. The engine is equipped with intercylinder deflectors, cylinder barrel deflectors, and channel cowl seals.

Note

Do not bend deflectors during removal. If deflectors are to be removed from more than one cylinder, tag each deflector for location.

5–29. Removal. a. To remove intercylinder deflectors from between cylinders No. 1 and 2, 3 and 4, 4 and 5, 6 and 7, 7 and 8, 8 and 9, and 9 and 1, loosen fasteners and withdraw deflectors toward rear of engine.

b. To remove intercylinder deflector from between cylinders No. 2 and 3, loosen fasteners and remove bolt, washer, and nut. Withdraw deflector toward rear of engine.

c. To remove intercylinder deflector from between cylinders No. 5 and 6, which is the drain sump location, first remove rocker box drain sump, which is cylinder No. 5 intake rocker box cover, in accordance with paragraph 5–13. Remove capscrews securing deflector to cylinders and remove deflector.

d. To remove cylinder barrel deflectors, remove intercylinder deflectors in accordance with steps *a* through *c* above. Remove bolt and washer and remove deflector from slots in bottom cylinder barrel fin. Withdraw deflector toward front of engine.

5–30. Cleaning. a. Clean deflectors with solvent (item 4, table 1–8).

b. Wipe each deflector dry using a clean, dry cloth.

5–31. Inspection. a. Inspect intercylinder and barrel deflectors for cracks, punctures, and distortion.

b. Check for missing fasteners and rivets.

c. Inspect for loose rivets.

d. Inspect for broken springs, hooks, and clips.

5–32. Installation. a. Position cylinder barrel deflector on cylinder by hooking it into slots in bottom cylinder barrel fin. Install bolt and washer and connect clamp springs. Secure bolt with lock wire.

b. Position intercylinder deflectors between cylinders No. 1 and 2, 3 and 4, 4 and 5, 6 and 7, 7 and 8, 8 and 9, 9 and 1, and secure deflector with fasteners.

c. Position intercylinder deflector between cylinders No. 2 and 3 and secure deflector with fasteners, bolt, washer, and nut.

d. Position intercylinder deflector between cylinders No. 5 and 6, which is the oil sump location. Install capscrews and secure with lock wire. Install rocker box drain sump, which is cylinder No. 5 intake rocker box cover, in accordance with paragraph 5–16.

5–33. Main Thrust Nut and Oil Seal. The oil seal ring completes the tappet oil annulus in the crankcase front section of the engine. The oil seal is installed in the crankcase front section flange.

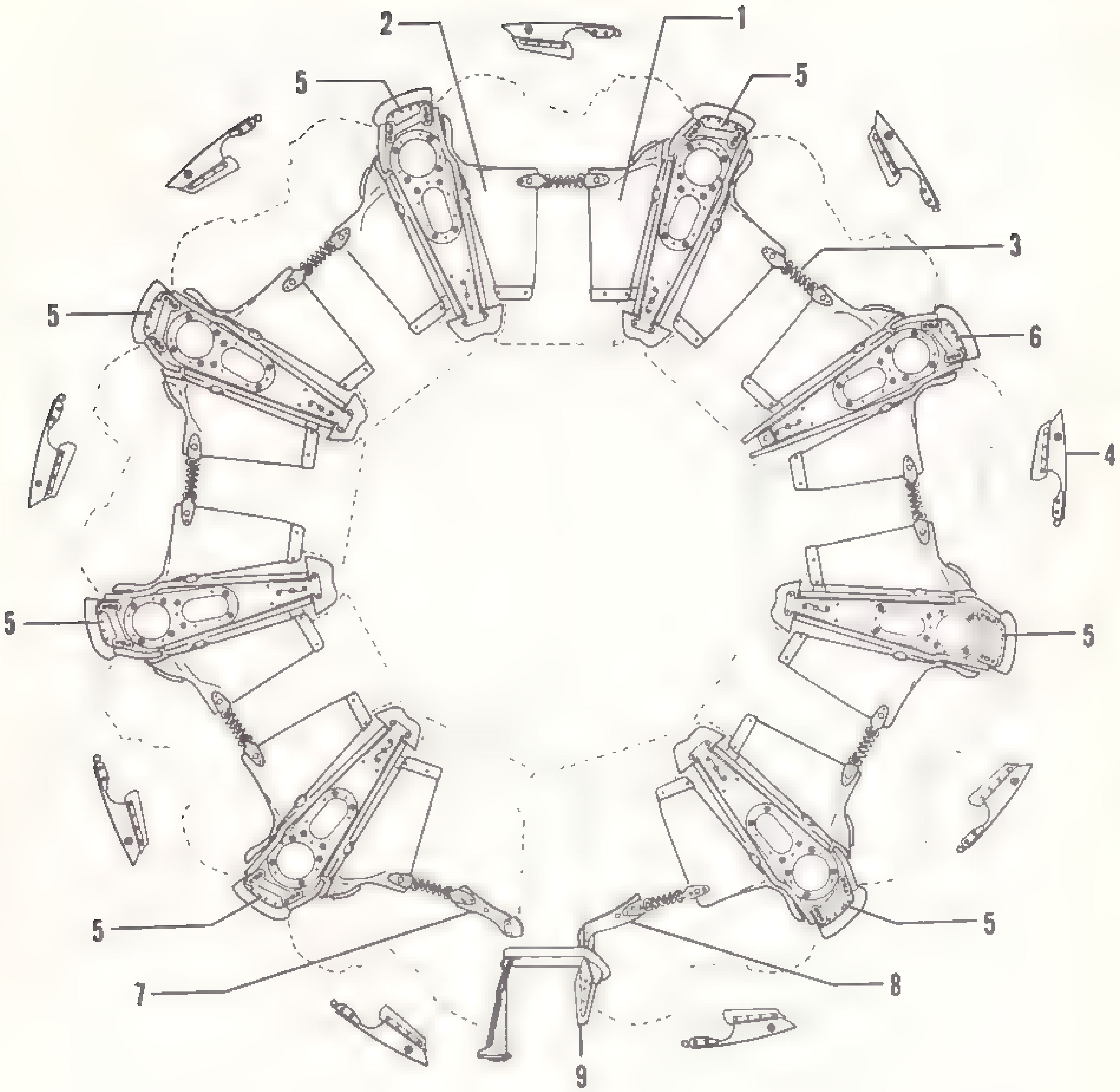
5–34. Cleaning. Clean main thrust nut with a clean cloth moistened with solvent (item 4, table 1–8).

5–35. Inspection. a. Inspect area around main thrust nut for evidence of oil leakage.

b. Check to insure that main thrust bearing nut is tight.

5–36. Front Oil Sump. The front oil sump collects oil from the crankcase front section, rocker box drain system, main section, and supercharger front housing, and pumps it back to the oil cells by the front oil pump. It also contains a passage from the left attaching flange through the center to the front attaching flange for pressure oil from the rear oil pump-to-crankcase front section. The oil sump body is attached to studs on the crankcase front section and supercharger front housing. It houses a simple scavenge pump with two sets of gears. The large gears are for the crankcase oil, and the small gears are for rocker box drainage which is fed from the rocker box drain sump directly into the rocker box scavenge oil pump. The oil sump contains a screen and a magnetic clip detector plug in the passage before the large gears. It also contains a check valve between the rocker box scavenge drain pump and the outlet passage. The sump has a three-hole flange for attachment of the outlet tube and a connection for an accessory oil return.

5–37. Removal. a. Place a suitable container under front oil sump and rocker box drain sump.



1. Cylinder Air Deflector — Intake
2. Cylinder Air Deflector — Exhaust
3. Cylinder Air Deflector Clamp Spring
4. Cowl Channel Seal Assembly
5. Intercylinder Air Deflector, Cylinders 1-2, 9-1, 8-9, 7-8, 6-7, 4-5 and 3-4
6. Intercylinder Air Deflector, Cylinder 2-3
7. Sump Deflector — Left Hand
8. Sump Deflector — Right Hand
9. Intercylinder Air Deflector At Sump Location

Figure 5—15. Cylinder air deflectors

b. Remove magnetic chip detector plug and strainer from front oil sump (figures 5—16 and 5—17), and drain oil from front oil sump.

c. Remove strainer from rocker box drain sump (figure 5—18) and drain oil from rocker box oil sump.

d. Remove rocker box drain sump-to-front oil scavenge tube.

e. Remove rocker box drain sump vent tube assembly.

f. Remove rocker box drain sump-to-cylinder No. 6 flexible drain tube assembly.

g. Remove screws securing rocker box drain sump support to cylinder No. 5.

Figure 5–16. Removing front oil sump magnetic chip detector plug

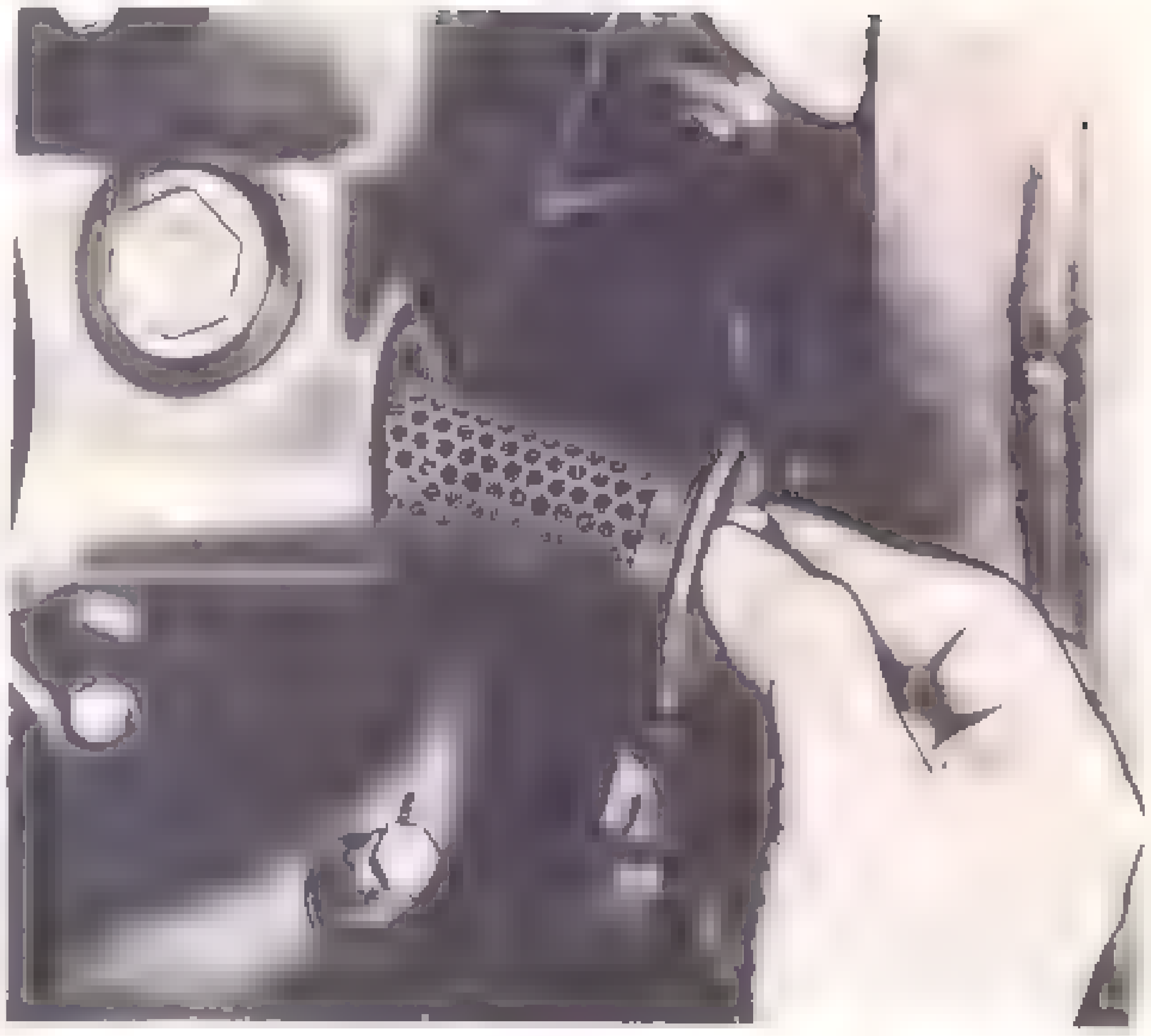


Figure 5–17. Removing front oil sump strainer

Figure 5–18. Removing strainer from rocker box drain sump

h. Remove rocker box drain sump, which is cylinder No. 5 intake rocker box cover, in accordance with paragraph 5–13.

i. Remove intercylinder deflector between cylinders No. 5 and 6 by removing capscrews securing deflector to cylinders No. 5 and 6.

j. Remove capscrews from external scavenge tube attaching flange at rear of front oil sump.

k. Remove nuts securing rear legs of front oil sump-to-supercharger front housing as shown in figure 5–19.

l. Remove nuts securing front oil sump to crankcase front section.

m. Pull front oil sump straight down and clear of mounting studs (figure 5–20) and remove front oil sump.

Caution

The front oil sump oil pump drive shaft may become disengaged as oil sump is withdrawn. Do not allow drive shaft to fall.

n. Remove front oil sump gaskets.

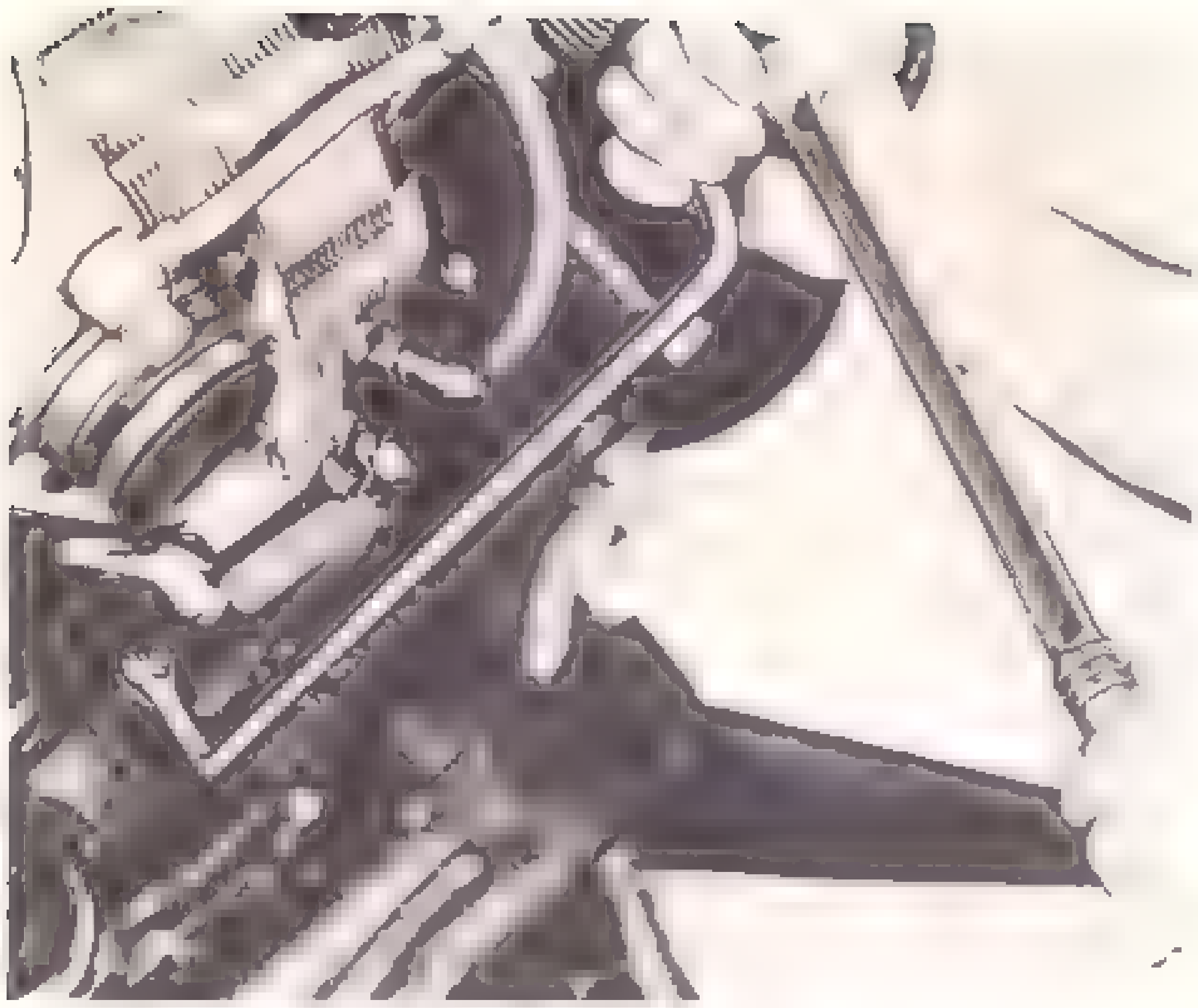


Figure 5–19. Removing front oil sump-to-supercharger front housing attaching nuts

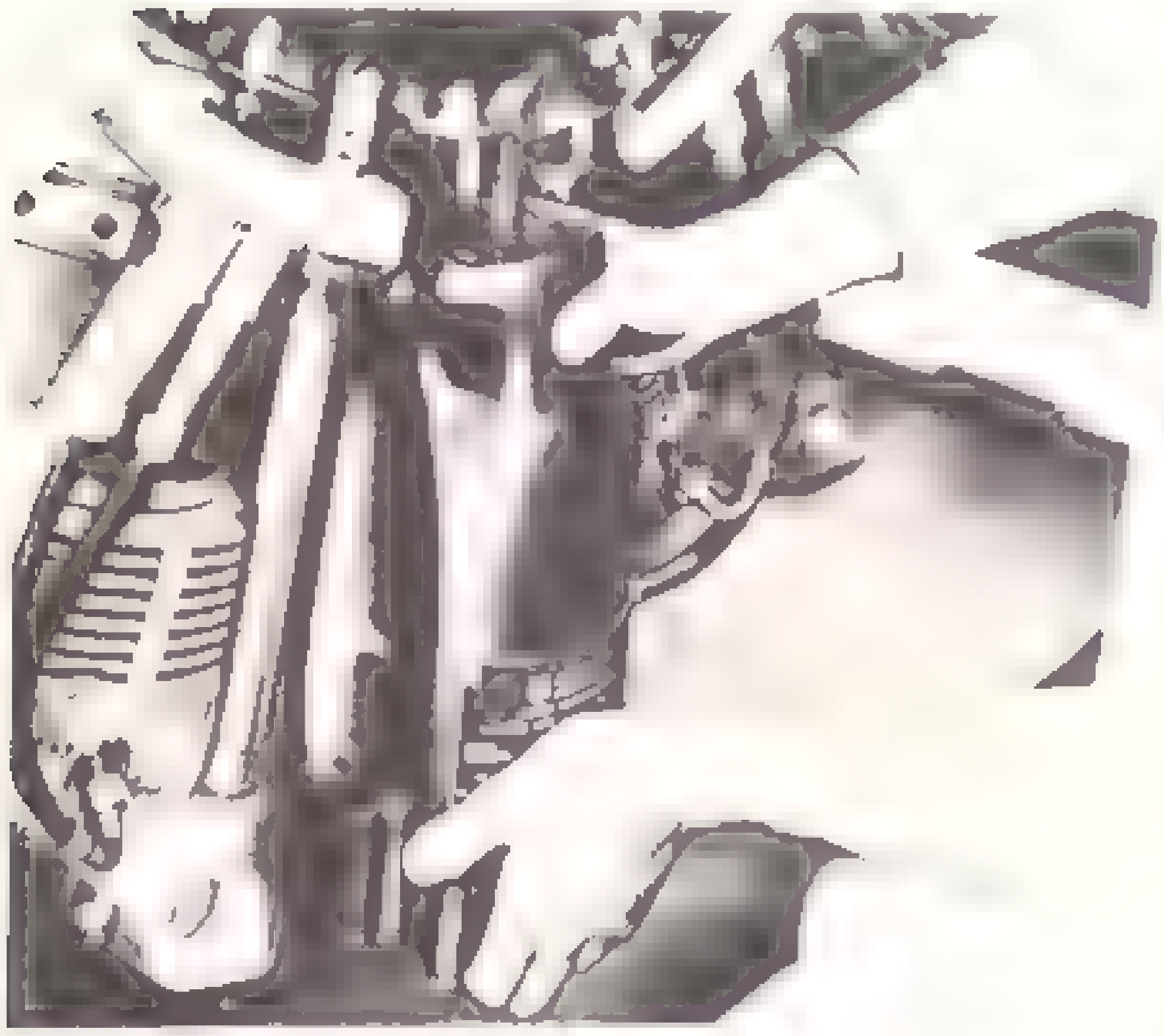


Figure 5–20. Removing front oil sump

o. Install a suitable protective cover over opening in supercharger front housing and crankcase front section.

5–38. *Cleaning. a.* Clean front oil sump and rocker box drain sump with solvent (item 4, table 1–8).

b. Drain front oil sump thoroughly before installing on engine.

c. Clean chip detector plug and strainers with solvent (item 4, table 1–8).

d. Clean all gasket material from front oil sump, supercharger front housing, and crankcase front section.

5–39. *Inspection. a.* Inspect front oil sump, strainer, and chip detector plug for foreign matter and metallic particles.

b. Inspect front oil sump for cracks.

c. Inspect studs in supercharger front housing and crankcase front section for stripped or malformed threads.

d. Inspect drive shaft of oil pump in front oil sump for worn or distorted splines.

5–40. *Installation. a.* Remove protective covers from openings in supercharger front housing and crankcase front section.

b. Coat gaskets with sealing compound (item 45, table 1–8) and install them over front oil sump mounting pad studs.

Note

Insure gaskets remain in place while front oil sump is being installed, but do not use an excessive amount of sealing compound.

c. Coat both ends of oil pump drive shaft with lubricating oil (item 61, table 1–8). Insert splined end of drive shaft through opening in top of front end of oil sump body and engage splines of drive shaft with splines of oil pump driving gear.

d. Position front oil sump between cylinders No. 5 and 6 and carefully raise onto attaching studs until drive shaft meshes with drive gear. If necessary, rotate engine to mesh gears, then push front oil sump against its mounting pads.

e. Pull front oil sump away from crankcase just enough to expose drive shaft. Rotate propeller shaft and insure that scavenge oil pump drive shaft turns freely and that gaskets are in place on front oil sump mounting pads.

f. When installation is satisfactory, secure front oil sump with nuts and washers.

g. Install intercylinder deflector between cylinders No. 5 and 6 and secure with capscrews.

h. Install rocker box drain sump, which is cylinder No. 5 intake rocker box cover. (Refer to paragraph 5–16.)

i. Secure rocker box drain sump support to cylinder No. 5 with screws. Secure screws with lock wire.

j. Install rocker box drain sump vent tube assembly.

k. Install rocker box drain sump-to-front oil sump scavenge tube.

l. Install rocker box drain sump-to-cylinder No. 6 drain tube.

m. Install strainer and chip detector plug in front oil sump and secure with lock wire.

n. Install strainer in rocker box drain sump and secure with lock wire.

5–41. Engine Mount Assembly. The engine mount assembly (figure 5–21) supports the engine

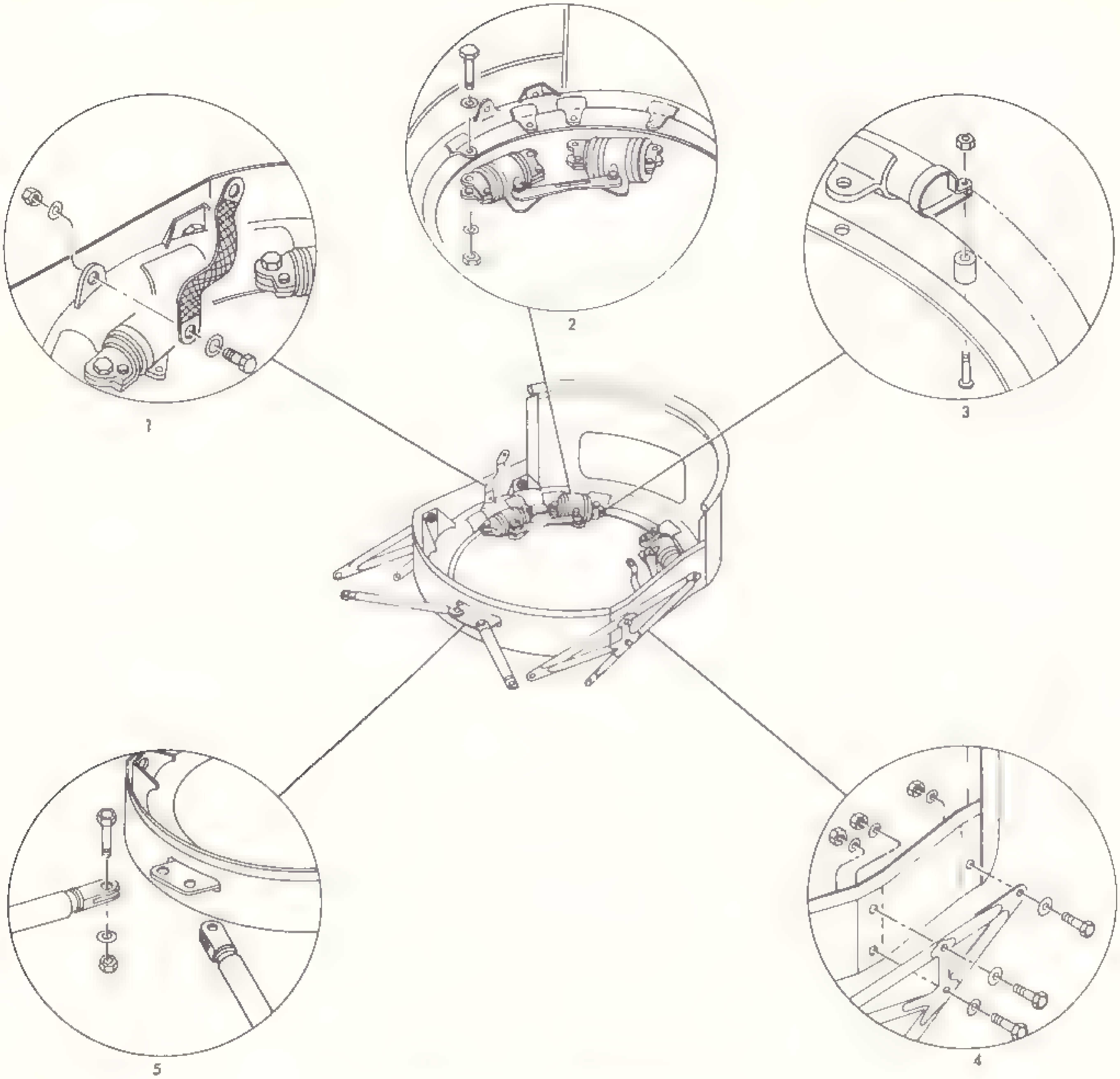
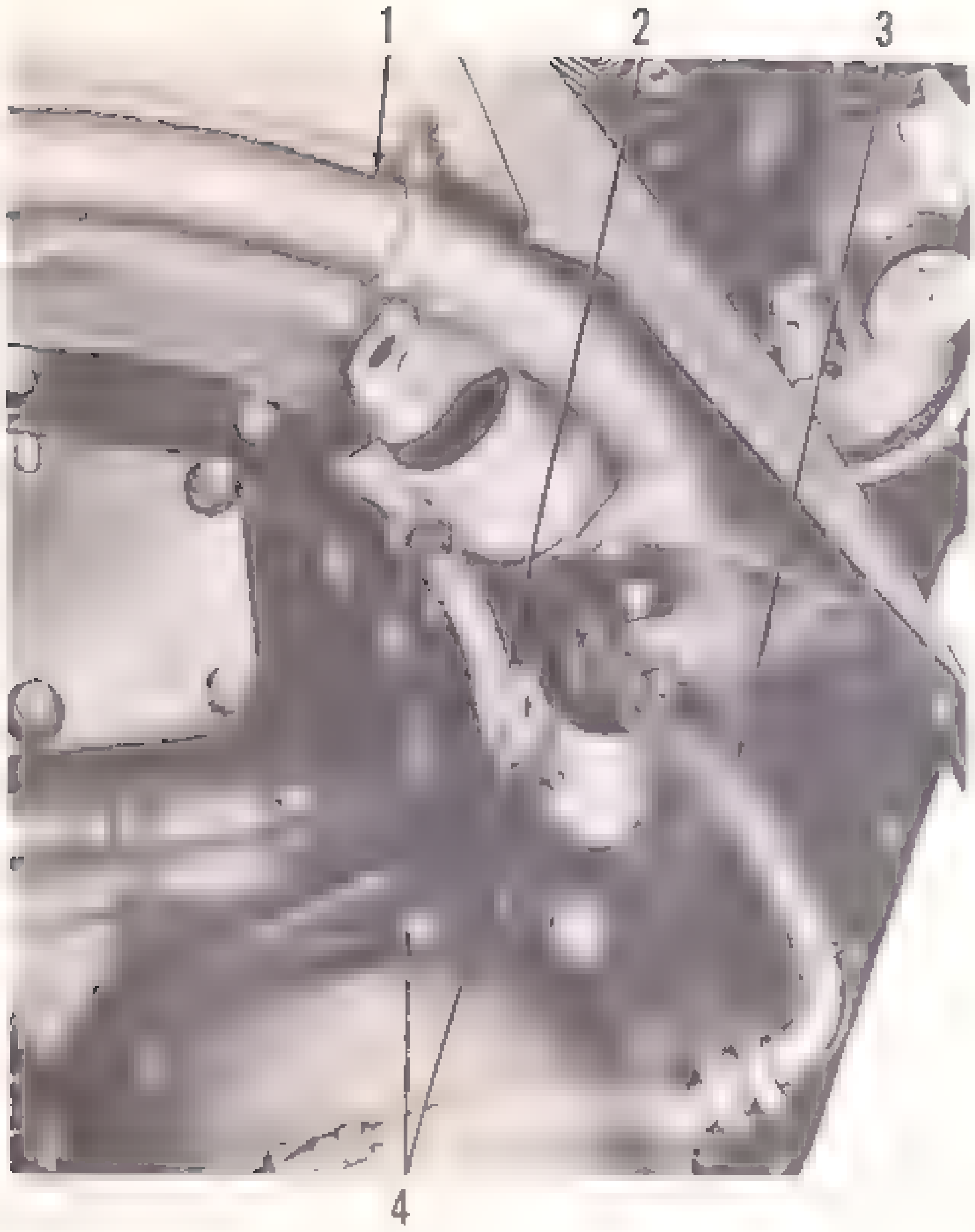


Figure 5—21. Engine mount assembly

within the engine compartment at the front of the helicopter. The engine mount assembly consists primarily of an accessory compartment shroud and an engine mount ring to which are bolted two engine mount support arms. The engine mount ring supports three double-bracket assemblies (figure 5—22) which are bolted to six of the engine mounting lugs. The engine mount support arms, which support the engine mount ring, are bolted at the lower end of the brackets on the forward bulkhead of the fuselage bottom structure, as shown in figure 5—23. The accessory compartment shroud cover assembly encircles the engine mount ring and is installed between the ring and support arms. The three double-bracket assemblies and two bonding jumpers are added to the engine mount assembly during engine mount buildup. The engine mount assembly consists of right- and left-hand tubular support arm assemblies bolted to a 1-3/4 by 0.095-inch diameter steel tubular ring. The support arms are a welded structure of 1-1/4 by 0.049-inch tubular steel bolted at the lower end to brackets on the forward bulkhead at station 46.5 of the bottom structure. A 3/4 by 0.058-



1. Ring Assembly
2. Double Bar
3. Magneto-to-Ignition Manifold Lead
4. Lock Wire

Figure 5—22. Double bracket assembly

inch tubular steel-sway brace extends from each support arm lower attachment point to a plate on the engine mount ring.

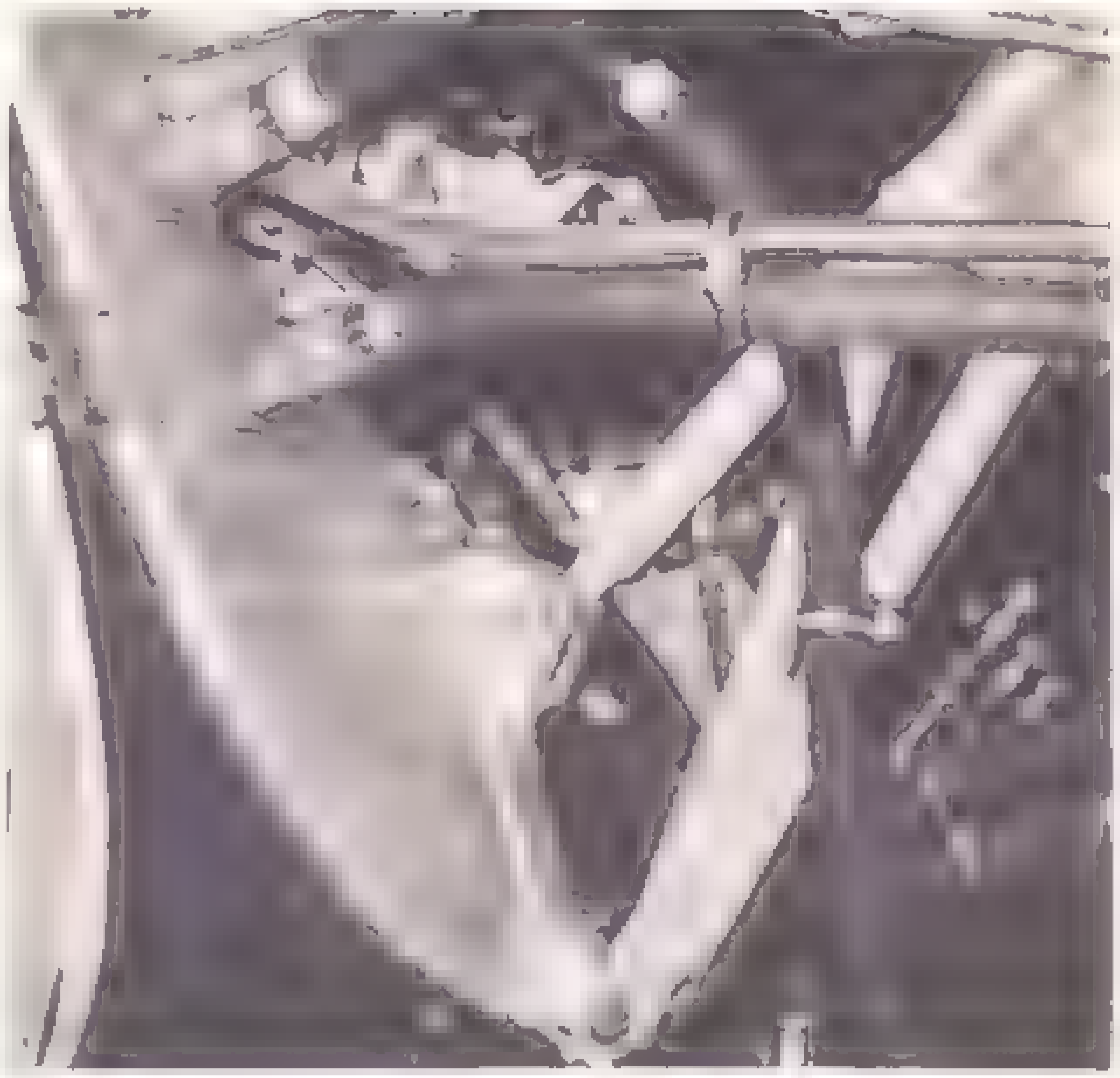


Figure 5—23. Engine mount attachment points

5—42. Cleaning. a. Clean engine mount assembly with solvent (item 4, table 1—8).

b. Dry with filtered, compressed air.

5—43. Inspection. a. Inspect all welded joints on engine mount assembly for cracks in welds.

b. Inspect bonding cables for security of attachment and breaks.

c. Inspect mounting ring for cracks and metal fatigue.

d. Inspect double-bracket assemblies for security of attachment and proper lockwiring.

e. Inspect for chafing of engine mount cooling tubes against double-bracket assemblies.

Section III Air Induction System

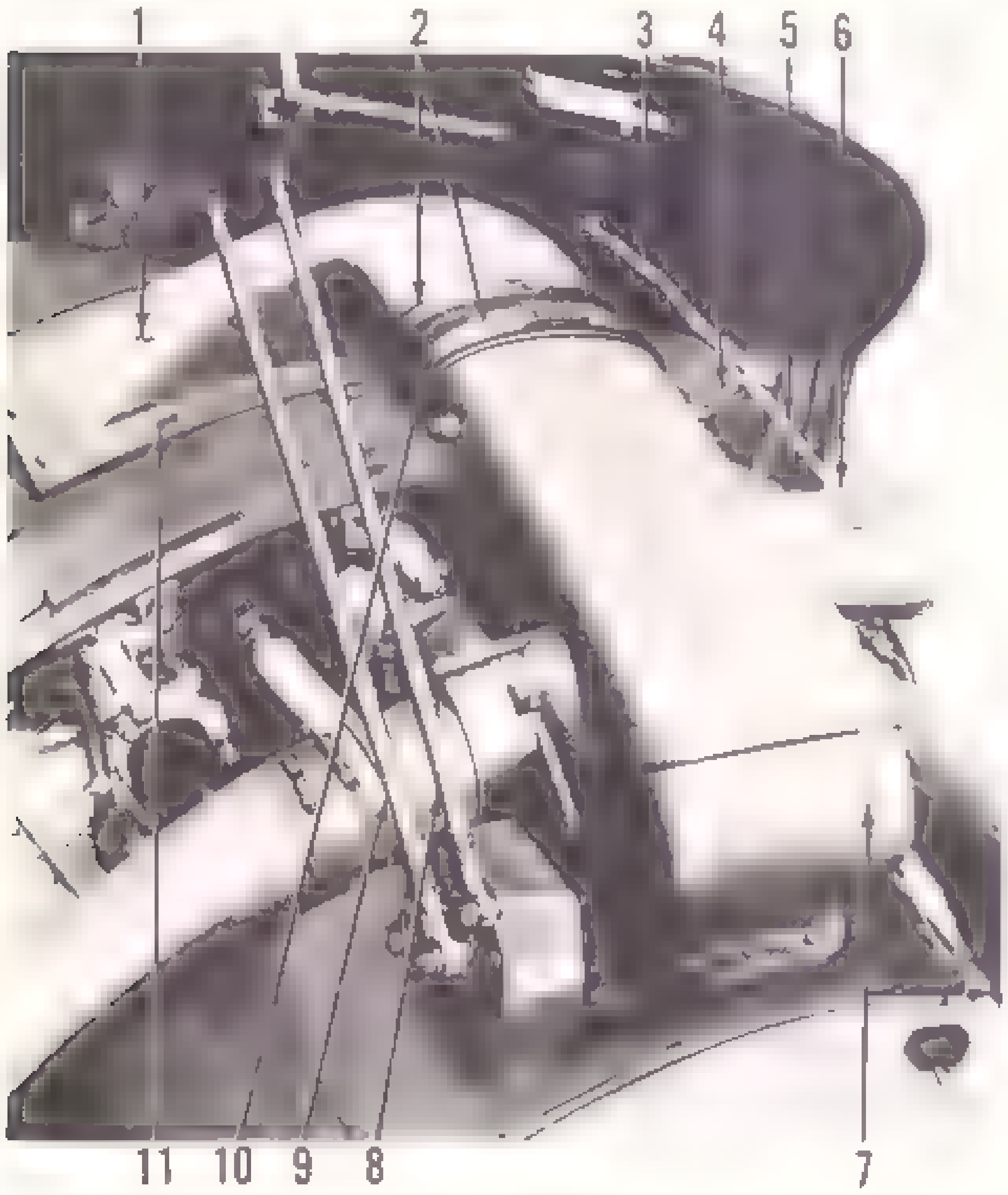
5–44. Description. The air induction system consists of a cold air elbow duct, air filter assembly, and air intake duct (mixing section). (See figures 5–24, 5–25, and 5–26.)

5–45. Cold Air Elbow Duct. The cold air elbow duct (1, figure 5–24, or 3, figure 5–25) is installed in the air induction system to direct filtered air from the engine cooling system to the air intake duct (7, figure 5–24, or 11, figure 5–25). The cold air elbow duct is secured to the upper cowl panel on the engine with fasteners and to the intake air duct with a rubber boot and clamps.

5–46. Removal. a. Open nose doors.

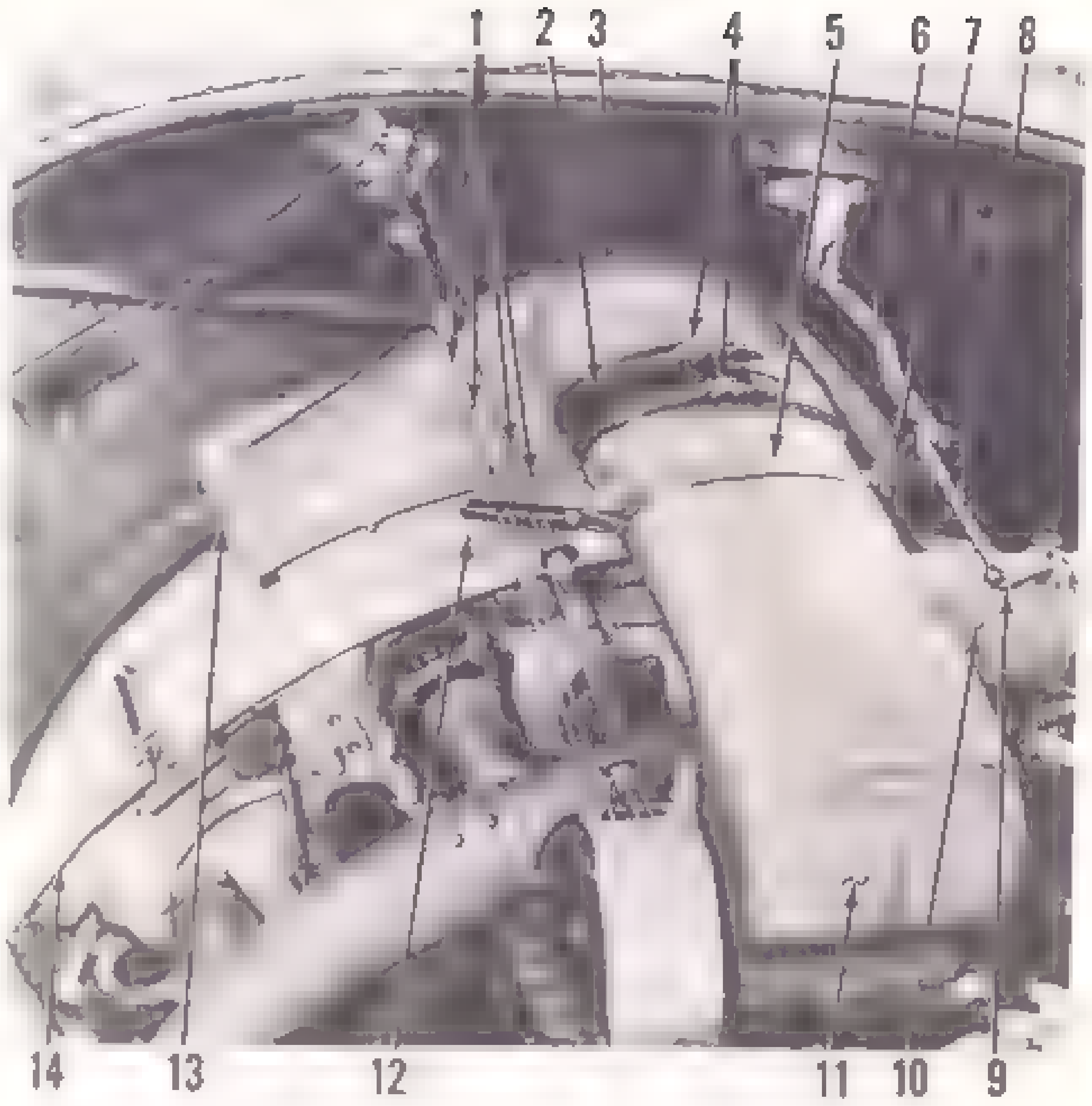
b. On helicopters serial No. prior to 55-4462, disconnect rods (8 and 9, figure 5–24) as follows:

(1) Remove bolt, washers, and nut securing end of rod (8) to bell crank near top of canted bulkhead. Disconnect rod.



1. Cold Air Elbow Duct
2. Clamps
3. Rod
4. Lever
5. Rod
6. Bell Crank
7. Air Intake Duct
8. Rod
9. Rod
10. Boot
11. Fastener

Figure 5–24. Air induction system and engine controls (helicopters serial No. prior to 55-4462)



1. Cables
2. Boot
3. Cold Air Elbow Duct
4. Clamps
5. Clamp
6. Rod
7. Lever
8. Rod
9. Bell Crank
10. Mixing Section Duct Cold Air Intake
11. Air Intake Duct
12. Cable Guide
13. Fastener
14. Engine Cowling

Figure 5–25. Air induction system and engine controls (helicopters serial No. 55-4462 and subsequent)

Caution

To insure that correct bolt is installed when rod is connected to bell crank, install bolt, washers, and nut on end of rod (8).

(2) Remove bolt, washers, and nut securing end of rod (9) to pulley near top of canted bulkhead. Disconnect rod.

Caution

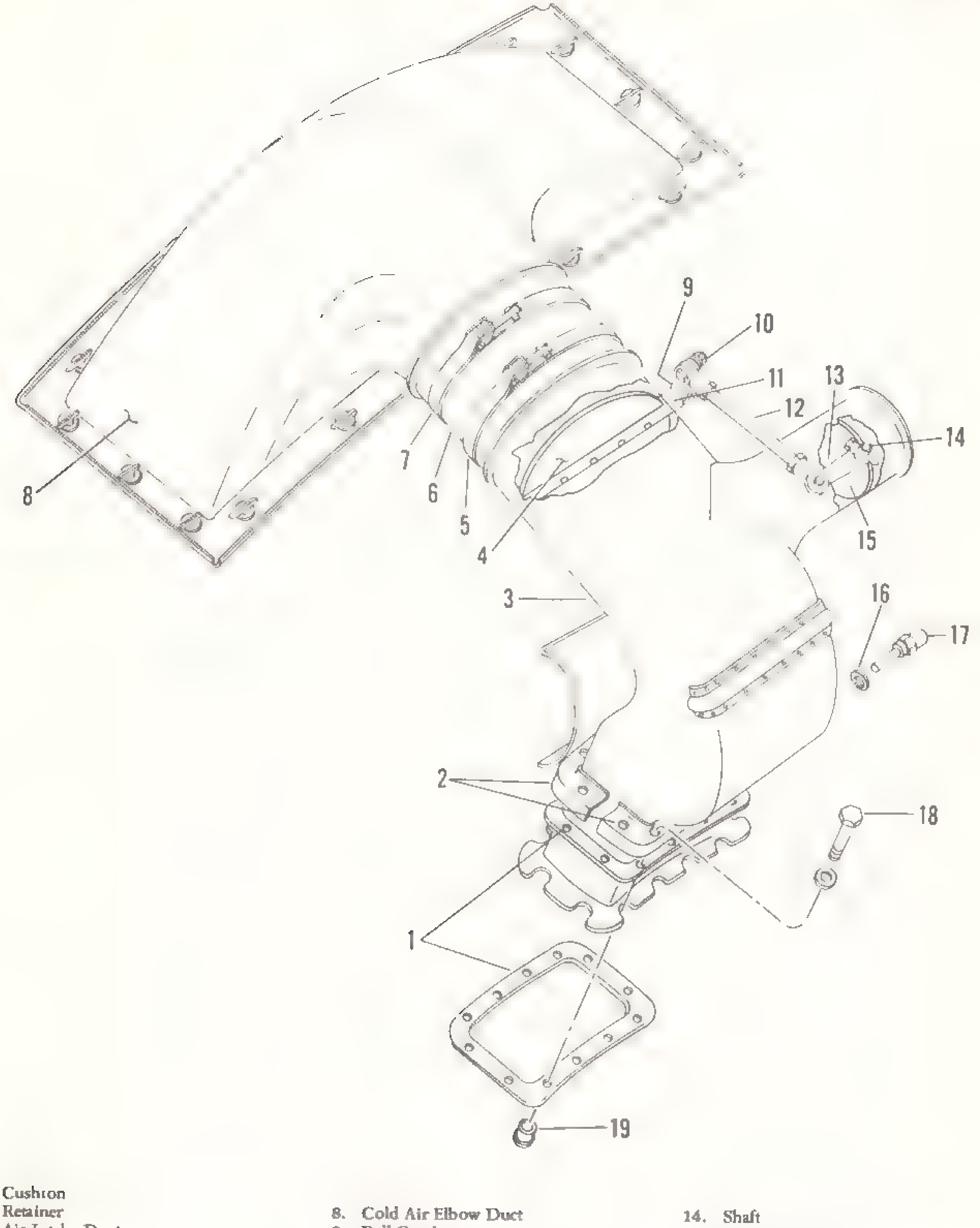
To insure that correct bolt is installed when rod is connected to pulley, install bolt, washers, and nut on end of rod (9).

(3) Swing rods (8 and 9) forward over accessory section of engine.

c. Remove bolt, washers, and nut securing rod (3, figure 5–24, or 6, figure 5–25) to lever (4, figure 5–24, or 7, figure 5–25). Disconnect rod.

Note

Reinstall bolt, washers, and nut in lever to hold rod (5, figure 5–24, or 8, figure 5–25) in place.



1. Cushion
2. Retainer
3. Air Intake Duct
4. Door
5. Clamp
6. Boot
7. Clamp
8. Cold Air Elbow Duct
9. Bell Crank
10. Bolt, Washers, Nut
11. Shaft
12. Control Rod
13. Bell Crank
14. Shaft
15. Door
16. Crush Washer
17. Carburetor Air Temperature Bulb
18. Bolt, Washer
19. Spacer

Figure 5—26. Air induction system installation

d. Remove clamps (2, figure 5—24, or 4, figure 5—25) securing boot (10, figure 5—24, or 2, figure 5—25) to cold air elbow duct (1, figure 5—24, or 3, figure 5—25). Fold boot back onto air intake duct (7, figure 5—24, or 11, figure 5—25).

e. Release fasteners securing cold air elbow duct (1, figure 5—24, or 3, figure 5—25). Remove cold air elbow duct from air filter support on upper cowl panel.

Note

On helicopters serial No. 55-4462 and subsequent, slide cold air elbow duct from beneath engine control cables.

5—47. *Cleaning.* Clean cold air elbow duct with solvent (item 4, table 1—8) and dry thoroughly with a clean, dry cloth.

5—48. *Inspection.* Inspect cold air elbow duct for cracks, corrosion, distortion, punctures, holes, and missing or damaged fasteners.

Note

Check area near mounting flange for possible cracks.

5—49. *Installation. a.* Position cold air elbow duct (1, figure 5—24, or 3, figure 5—25) on air filter support of upper cowl panel and secure with fasteners.

Caution

Insure that air filter assembly is in place in air filter support before installing cold air elbow duct.

Note

On helicopters serial No. 55-4462 and subsequent, slide cold air elbow duct under engine control cables.

b. Position boot (10, figure 5—24, or 2, figure 5—25) on cold air elbow duct (1, figure 5—24, or 3, figure 5—25) and secure with clamps (2, figure 5—24, or 4, figure 5—25).

c. Connect rods (3 and 5, figure 5—24, or 6 and 8, figure 5—25) to lever (4, figure 5—24, or 7, figure 5—25) with bolt, washers, and nut.

Caution

Insure that bolt, washers, and nut are properly secured.

d. On helicopters serial No. prior to 55-4462, connect rods (8 and 9, figure 5—24) as follows:

(1) Connect rod (8) to bell crank near top of canted bulkhead with bolt, washers, and nut.

Caution

Insure that rod is connected to bell crank with same bolt, washers, and nut that are installed on end of rod. Insure that bolt, washers, and nut are properly secured.

(2) Connect rod (9) to pulley near top of canted bulkhead with bolt, washers, and nut.

Caution

Insure that rod is connected to pulley with same bolt, washers, and nut that are installed on end of rod. Insure that bolt, washers, and nut are properly secured.

e. Check engine controls in pilot's compartment for freedom of movement and adjustment. (For engine control adjustment, notify direct support maintenance unit.)

f. Close nose doors.

5—50. Air Filter Assembly. The air filter assembly is installed in the air filter support, located on the upper cowl panel, and is secured in place with the cold air elbow duct. The air filter assembly filters the cooling ram air produced by the engine fan prior to entry into the air induction system.

5—51. *Removal. a.* Remove cold air elbow duct. (Refer to paragraph 5—46.)

b. Remove air filter assembly from air filter support on upper cowl panel.

5—52. *Cleaning. a.* Place air filter assembly in solvent (item 4, table 1—8) and agitate solvent or rock air filter assembly to insure removal of internal dirt from filter element.

b. After air filter assembly is free of dirt, remove air filter assembly from solvent and place on a suitable draining rack in a position which will facilitate draining. Allow air filter assembly to dry thoroughly.

5—53. *Inspection.* Inspect air filter assembly for cleanliness, cracked or broken frame, and deteriorated or damaged filter element.

5—54. *Lubrication. a.* Immerse air filter assembly in a lubricating mixture consisting of one part corrosion preventive compound (item 27, table 1—8) and three parts lubricating oil (item 2, table 1—8) for 2 to 5 minutes.

Caution

Insure that air filter assembly is completely dry before immersing in lubricating mixture; otherwise, filter element of air filter assembly will not be properly coated with lubricating mixture and efficiency will be impaired.

b. Place air filter assembly on a suitable draining rack in a position that will facilitate draining. Allow air filter assembly to drain for 2 to 4 hours.

5—55. *Installation. a.* Place air filter assembly in air filter support on upper cowl panel.

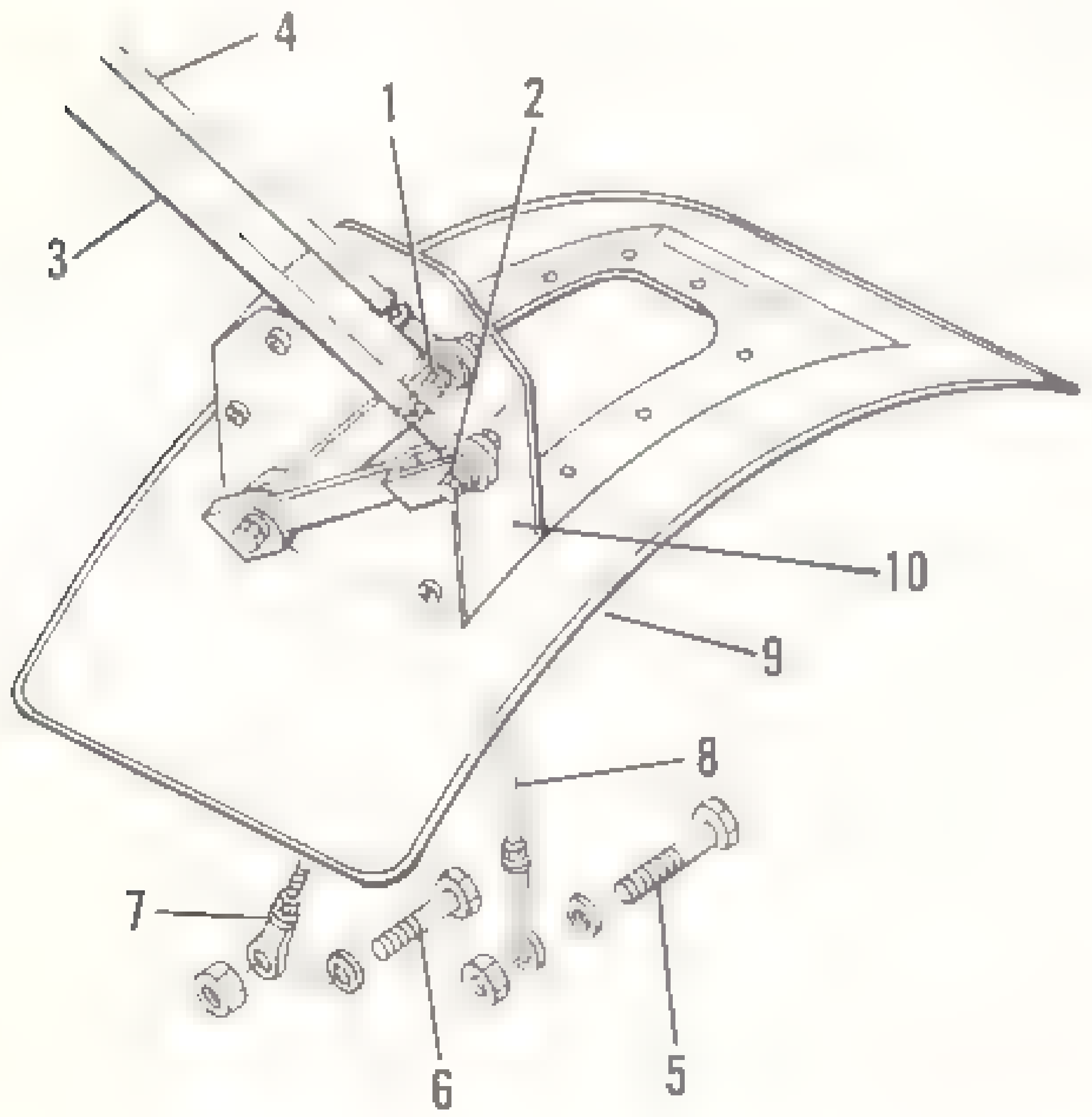
b. Install cold air elbow duct. (Refer to paragraph 5—49.)

5–56. Air Intake Duct (Mixing Section). Cold ram air from the engine cooling system is supplied to the cold air entrance of the air intake duct (3, figure 5–26) through the cold air elbow duct (8). An entrance on the right side of the air intake duct over the exhaust collector supplies warm air to the air intake duct. Doors (4 and 15) in both the cold and warm air entrances of the air intake duct enable the pilot to control temperature of the air entering the carburetor. Bell cranks (9 and 13) that control these doors are connected by a control rod (12) in such a manner that the movement of each door is synchronized; when one door is open, the other door is closed. The lower end of the air intake duct is positioned on a well assembly (9, figure 5–27, or 5, figure 5–28) and secured to the carburetor. The upper end of the air intake duct is secured to the cold air elbow duct (8, figure 5–26). Provisions are made for the installation of an engine preheat duct on the warm air entrance of the air intake duct. (See figures 5–24 and 5–25.)

5–57. *Removal. a.* Remove cold air elbow duct (8, figure 5–26). (Refer to paragraph 5–46.)

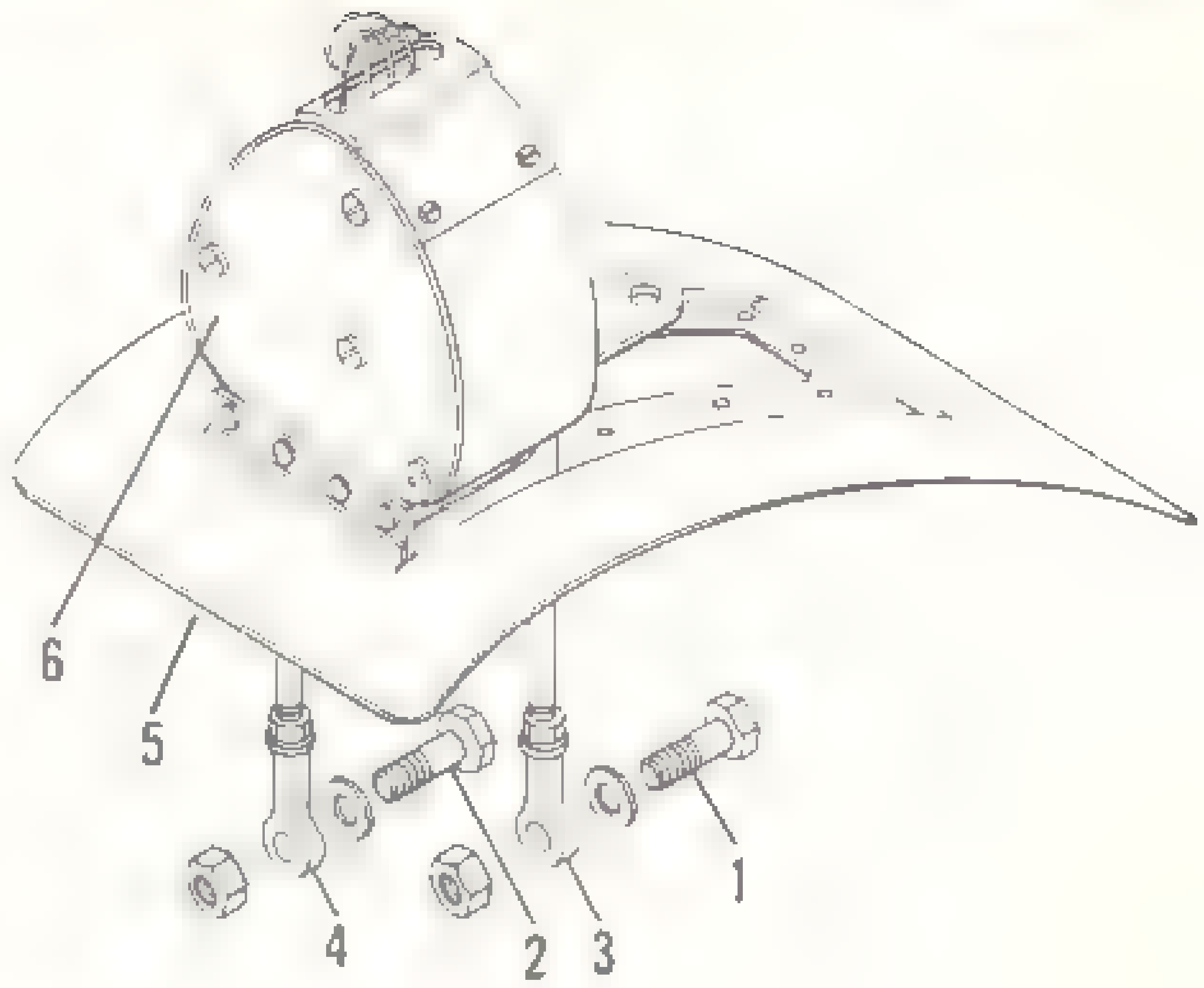
b. Remove air filter assembly. (Refer to paragraph 5–51.)

c. Remove clamp (5) and boot (6) from air intake duct (3).



1. Bolt, Washers, Nut
2. Bolt, Washers, Nut
3. Control Rod
4. Control Rod
5. Bolt, Washer, Nut
6. Bolt, Washer, Nut
7. Control Rod
8. Control Rod
9. Well Assembly
10. Throttle and Mixture Control Assembly

Figure 5–27. Engine controls and well assembly (helicopters serial No. prior to 55-4462)



1. Bolt, Washer, Nut
2. Bolt, Washer, Nut
3. Control Rod
4. Control Rod
5. Well Assembly
6. Throttle and Mixture Control Assembly

Figure 5–28. Engine controls and well assembly (helicopters serial No. 55-4462 and subsequent)

Note

Clamp (7) is removed during removal of cold air elbow duct (8).

d. On helicopters serial No. 55-4462 and subsequent, disconnect cables (1, figure 5–25) at quick disconnect and separate cables from cable guide (12).

e. Disconnect electrical plug from carburetor air temperature bulb (17, figure 5–26).

f. Remove upper cowl panel. (Refer to paragraph 5–184.)

g. Remove upper section of exhaust collector. (Refer to paragraph 5–63.)

h. Remove upper shroud panel. (Refer to paragraph 5–189.)

i. On helicopters serial No. prior to 55-4462, disconnect control rods (7 and 8, figure 5–27) from linkage on carburetor by removing bolts, washers, and nuts (5 and 6). Disconnect brackets of throttle and mixture control assembly (10) from flange of air intake duct (3, figure 5–26) by removing bolts and washers (18). Separate throttle and mixture control assembly from well assembly (9, figure 5–27).

Note

Control rods (3 and 4) are disconnected from pulley and bell crank near canted bulkhead during removal of cold air elbow duct (8, figure 5–26).

j. On helicopters serial No. 55-4462 and subsequent, disconnect control rods (3 and 4, figure 5–28)

from linkage on carburetor by removing bolts, washers, and nuts (1 and 2). Disconnect brackets of throttle and mixture control assembly (6) from flange of air intake duct (3, figure 5–26) by removing bolts and washers (18). Separate throttle and mixture control assembly from well assembly (5, figure 5–28).

k. Remove remaining bolts and washers (18, figure 5–26) securing air intake duct (3) to carburetor. Remove air intake duct, retainer (2), cushions (1), and spacers (19).

l. Remove well assembly (9, figure 5–27, or 5, figure 5–28) from carburetor.

m. Install protective cover over air inlet screen on carburetor.

5–58. *Cleaning.* Clean air intake duct and well assembly with a cloth moistened with solvent (item 4, table 1–8). Dry thoroughly with a clean cloth.

Caution

Do not soak rod end bearings of control rod (12, figure 5–26) in solvent.

5–59. *Inspection. a.* Inspect air intake duct for cracks, corrosion, holes, punctures, distortion, and damaged threads.

b. Inspect reinforcement and bosses on air intake duct for cracks and security of attachment.

c. Inspect exhaust shield on air intake duct for cracks, loose or missing rivets, and security of attachment.

d. Inspect seals on doors for damage, deterioration, and security of attachment.

e. Inspect doors for cracks, distortion, and security of attachment.

f. Inspect bell cranks for cracks, corrosion, and security of attachment.

g. Inspect shafts for bends, binding, corrosion, and security of attachment.

h. Inspect control rods for bends, corrosion, cracks, and defective rod end bearings.

i. Check doors for proper synchronization.

Note

When one door is fully closed, other door should be fully open. (For adjustment, notify direct maintenance support unit.)

j. Inspect well assembly for cracks, distortion, corrosion, and elongated mounting holes.

k. Inspect boot for tears, punctures, and deterioration.

5–60. *Installation. a.* Remove protective cover from air inlet screen on carburetor.

b. Insure that air inlet screen and two gaskets are in place on deck of carburetor.

Note

One gasket should be on carburetor; then air inlet screen, and then second gasket on air inlet screen.

c. Position well assembly (9, figure 5–27, or 5, figure 5–28) over air inlet screen until it rests on upper gasket on carburetor. Align holes in well assembly with holes in gaskets, air inlet screen, and carburetor.

d. Position a cushion (1, figure 5–26) on each surface of mounting flange of air intake duct (3). Install spacers (19) and retainer (2).

Note

Spacers (19) are installed with flange down.

e. Position air intake duct (3), with cushion (1), retainer (2), and spacers (19) in place, on well assembly (9, figure 5–27, or 5, figure 5–28), and secure to carburetor with bolts and washers (18, figure 5–26) at five holes on right side of carburetor.

f. Position throttle and mixture control assembly (10, figure 5–27, or 6, figure 5–28) on flange of air intake duct (3, figure 5–26) and secure with remaining bolts and washers (18).

g. Tighten bolts and washers (18) installed in steps *e* and *f* above, and secure with lock wire.

h. On helicopters serial No. prior to 55-4462, connect control rods (7 and 8, figure 5–27) to linkage on carburetor by installing bolts, washers, and nuts (5 and 6).

Warning

To prevent binding or malfunctioning of engine controls during engine operation, insure that bolts are correctly installed and properly secured.

Note

Control rods (3 and 4) are connected to pulley and bell crank near canted bulkhead during installation of cold air elbow duct (8, figure 5–26).

i. On helicopters serial No. 55-4462 and subsequent, connect control rods (3 and 4, figure 5–28) to linkage on carburetor by installing bolts, washers, and nuts (1 and 2).

Warning

To prevent binding or malfunctioning of engine controls during engine operation, insure that bolts are correctly installed and properly secured.

j. Install upper section of exhaust collector. (Refer to paragraph 5–66.)

k. Install upper cowl panel. (Refer to paragraph 5–187.)

l. Position one-half length of boot (6, figure 5–26) on cold air entrance of air intake duct (3) and secure with clamp (5).

m. Install air filter assembly and cold air elbow duct (8). (Refer to paragraphs 5–55 and 5–49.)

n. On helicopters serial No. 55-4462 and subsequent, place cables (1, figure 5–25) in cable guide (12) and connect cables to quick-disconnect.

o. Install upper shroud panel. (Refer to paragraph 5–192.)

p. Connect electrical plug to carburetor air temperature bulb (17, figure 5–26). Secure electrical plug with lock wire.

q. Check engine controls in pilots' compartment for freedom of movement and proper adjustment. (Notify direct support maintenance unit for adjustment.)

r. Close nose doors.

Section IV Exhaust System

5–61. Description. The exhaust system consists of an exhaust collector assembly which contains seven sleeve-type clamps and a collector assembly.

5–62. Exhaust Collector Assembly. Seven welded section assemblies and one tailpipe section make up the collector assembly. The ring-type clamps that secure the exhaust collector assembly to the cylinder exhaust ports are components of the engine. (See figures 5–29 and 5–30.)

5–63. *Removal. a.* Place BATT and GEN switches in OFF position.

b. Open nose doors.

c. Remove bolt, washer, and nut (1, figure 5–30) from ring-type clamp (2) joining cylinder end of section assembly (12, figure 5–29) and exhaust port of cylinder No. 8. Slide ring-type clamp onto section assembly.

d. Remove bolts, washers, and nuts (3, figure 5–30) from sleeve-type clamp (4) at connection of section assemblies (1 and 12, figure 5–29).

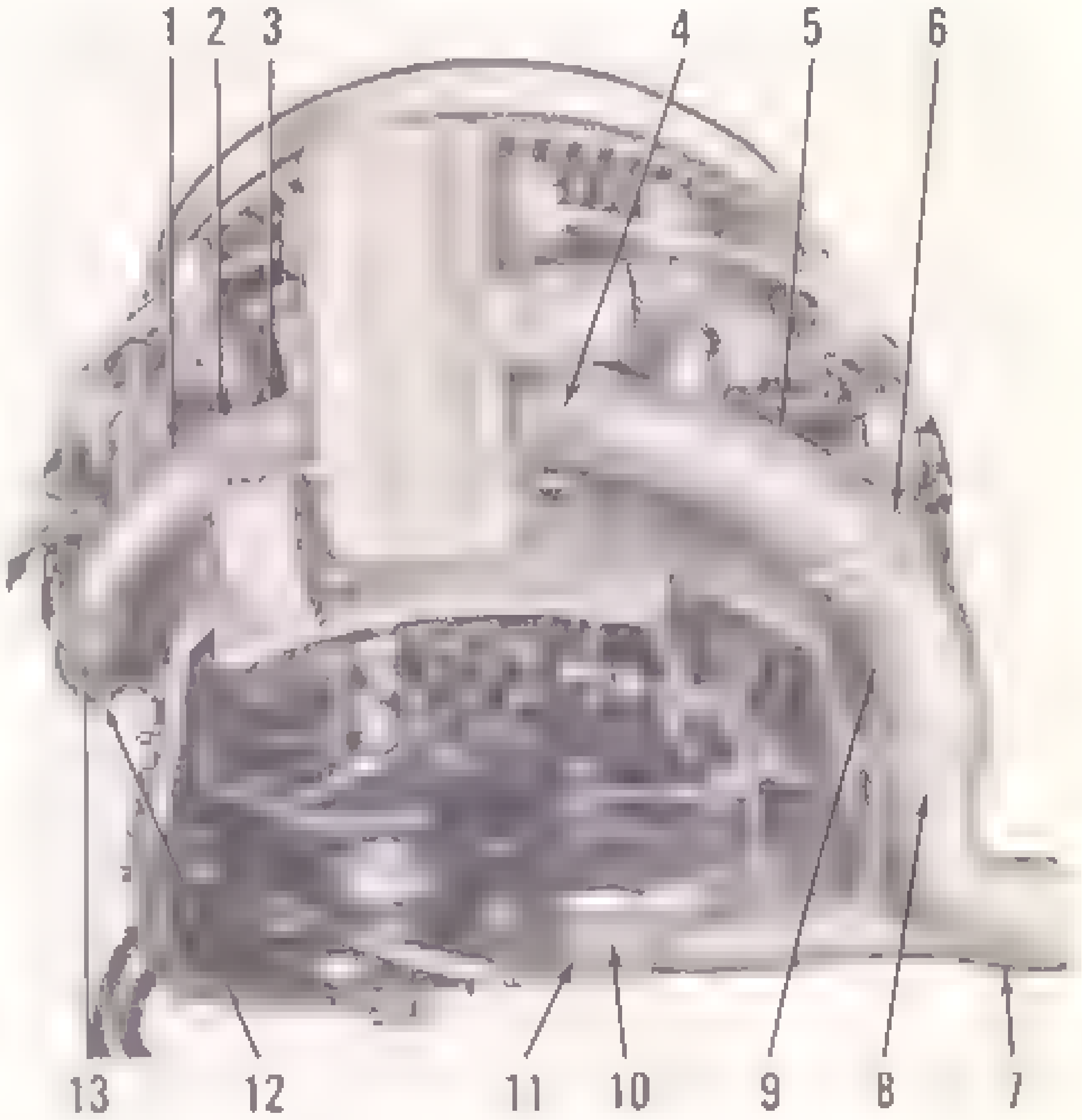
e. Slide section assembly (12) from end of section assembly (1) and swing cylinder end of section assembly (12) from exhaust port of cylinder No. 8. Remove section assembly (12), ring-type clamp (2, figure 5–30), and sleeve-type clamp (4). Install protective cover on cylinder exhaust port.

f. At cylinders No. 9, 1, 2, and 3, remove section assemblies (1, 3, 5, and 9, figure 5–29) as outlined in steps *c* through *e* above.

Note

Start at cylinder No. 9 and work toward tailpipe section (7).

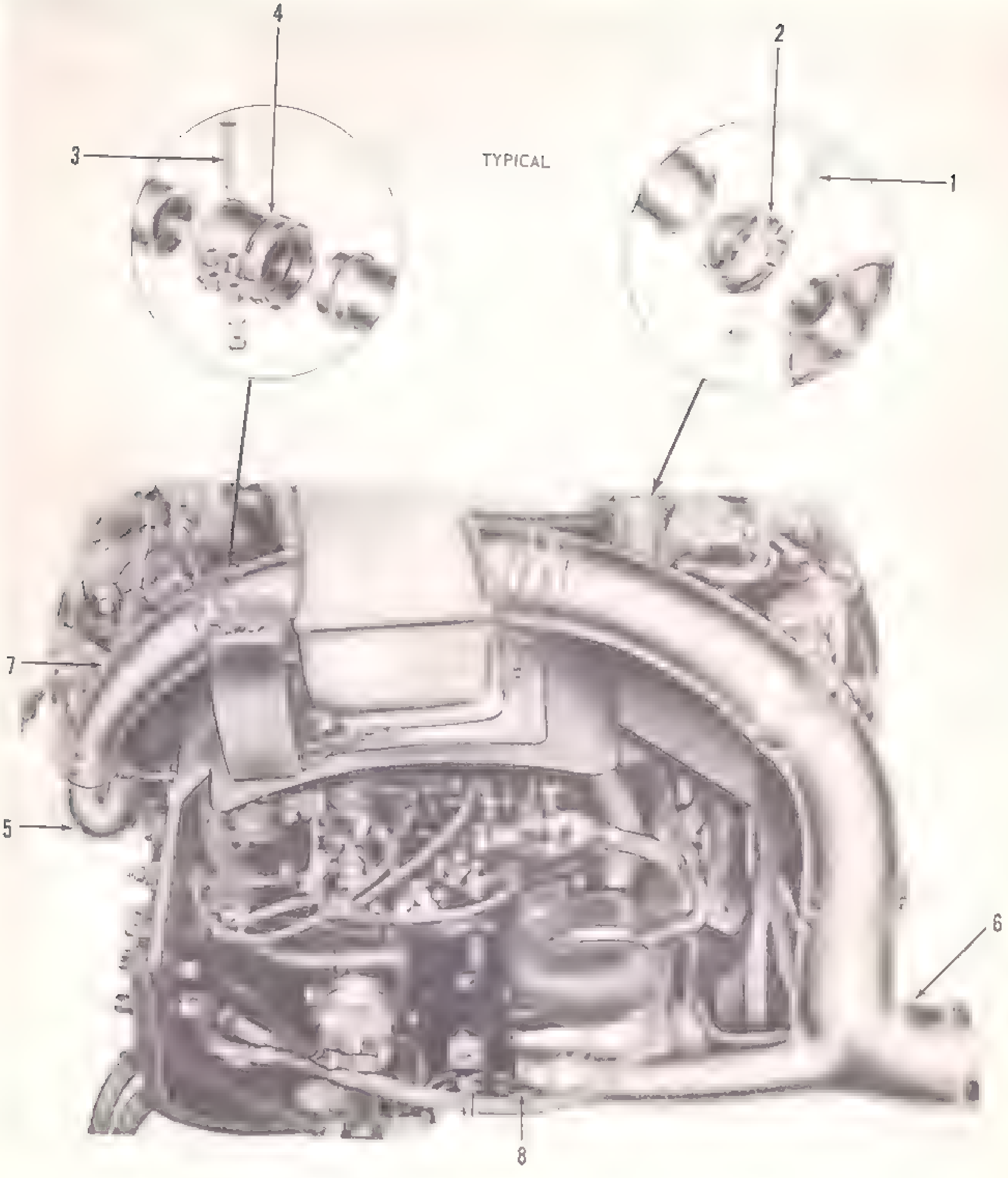
g. At cylinder No. 7, remove bolt, washer, and nut (1, figure 5–30) from ring-type clamp (2), joining cylinder end of exhaust section assembly and exhaust port of cylinder No. 7. Slide ring-type clamp onto exhaust section assembly.



1. Section Assembly
2. Sleeve-Type Clamp
3. Section Assembly
4. Sleeve-Type Clamp
5. Section Assembly
6. Sleeve-Type Clamp
7. Tail Pipe Section
8. Sleeve-Type Clamp
9. Section Assembly
10. Sleeve-Type Clamp
11. Section Assembly
12. Section Assembly
13. Sleeve-Type Clamp

Figure 5–29. Exhaust collector assembly installation

h. Remove bolts, washers, and nuts (3) from sleeve-type clamp (4) at connection of exhaust section assembly (cylinder No. 7) and section assembly (11, figure 5–29).



1. Bolt, Washer, Nut
2. Ring-Type Clamp
3. Bolt, Washer, Nut
4. Sleeve-Type Clamp
5. Section Assembly
6. Tail Pipe Section
7. Section Assembly
8. Section Assembly

Figure 5—30. Sleeve-type clamp and ring-type clamp installation (typical)

i. Slide exhaust section assembly (cylinder No. 7) from end of section assembly (11) and swing cylinder end of exhaust section assembly from exhaust port of cylinder No. 7. Remove exhaust section assembly, ring-type clamp (2, figure 5—30), and sleeve-type clamp (4). Install protective cover on cylinder exhaust port.

j. Remove bolt, washer, and nut (1) from ring-type clamp (2), joining cylinder end of section assembly (11, figure 5—29) and exhaust port of cylinder No. 6.

k. Remove bolts, washers, and nuts (3, figure 5—30) from sleeve-type clamp at connection of section assembly (11, figure 5—29) and tailpipe section (7).

l. Slide section assembly (11) from end of tailpipe section (7), and swing section assembly away from exhaust port No. 6. Remove section assembly, ring-type clamp (2, figure 5—30), and sleeve-type clamp (4). Install protective cover on cylinder exhaust port.

m. Remove bolts, washers, and nuts (1) from ring-type clamps (2), joining cylinder ends of tailpipe section (7, figure 5—29) and exhaust ports of cylinders No. 4 and 5. Remove tailpipe section and ring-type clamps. Install protective cover on each cylinder exhaust port.

5—64. *Cleaning.* *a.* Clean exhaust collector assembly with solvent (item 4, table 1—8).

b. Dry with a clean, dry cloth or blow dry with compressed air.

5—65. *Inspection.* *a.* Inspect tailpipe section and section assemblies for cracks, holes, burning, erosion, rust, distortion, and clogged drain holes.

b. Inspect sleeve-type clamps for cracks, burning, distortion, rust, erosion, and holes.

c. Inspect bolts and nuts for cracks, damaged threads, rust, and erosion.

d. Inspect ring-type clamps for cracks, burning, distortion, erosion, rust, and damage.

5—66. *Installation.* *a.* Remove protective cover from each cylinder exhaust port.

b. Position ring-type clamps (2, figure 5—30) on exhaust port connections of tailpipe section (7, figure 5—29).

c. Install tailpipe section (7) at cylinder exhaust port of cylinders No. 4 and 5, and secure with ring-type clamps (2, figure 5—30) and bolts, washers, and nuts (1). Tighten bolt, washer, and nut on each ring-type clamp only enough to hold tailpipe section in place.

d. Position sleeve-type clamps (8 and 10, figure 5—29) on each end of tailpipe section (7). (Refer to table 5—2 for sleeve-type clamp arrangement.)

Table 5—2. Location of sleeve-type clamps

SLEEVE-TYPE CLAMP PART NO.	AT JOINT BETWEEN SECTION (PART NO.)
S1630-80903-31	S1630-80901-45 and -46
S1630-80903-31	S1630-80901-50 and -51
S1630-80903-32	S1630-80901-46 and -47
S1630-80903-32	S1630-80901-49 and -50
S1630-80903-33	S1630-80901-40 and -47
S1630-80903-34	S1630-80901-40 and -48
S1630-80903-35	S1630-80901-48 and -49

Table 5—3. Location of sections of exhaust collector assembly

SECTION PART NO.	CYLINDER NO.
S1630-80901-40	2
S1630-80901-45	8
S1630-80901-46	9
S1630-80901-47	1
S1630-80901-48	3
S1630-80901-49	4 and 5
S1630-80901-50	6
S1630-80901-51	7

e. Position a sleeve-type clamp (4, figure 5—30) on end of each section assembly (cylinders No. 1, 2, 3, 6, 7, 8, and 9) as listed in table 5—3. (Refer to table 5—2 for sleeve-type clamp arrangements.)

f. Position a ring-type clamp (2, figure 5—30) on exhaust port connection of each section assembly (cylinders No. 1, 2, 3, 6, 7, 8, and 9). Secure each section assembly to proper cylinder exhaust port, as listed in table 5—3, with a ring-type clamp and a bolt, washer, and nut (1). Tighten each bolt, washer, and nut only enough to hold each section assembly in place.

Note

Recess in each ring-type clamp (2) must be aligned with top recess on cylinder exhaust port.

g. After assembly of each section assembly listed in step *f* above, tighten nuts that secure ring-type clamps to a torque of 100 to 120 inch-pounds.

h. Position each sleeve-type clamp (4) in place as listed in table 5—2 and secure with bolts, washers, and nuts (3). Tighten nuts at each sleeve-type clamp until sleeve-type clamp cannot be rotated around pipe axis by lightly tapping bolt heads.

Caution

Do not, under any circumstances, tighten nuts so as to bend sleeve-type clamp, lugs, or bolts.

i. Loosen nuts alternately at each sleeve-type clamp until sleeve-type clamp can be rotated around pipe axis by lightly tapping bolt heads.

Note

After first 1 or 2 hours of engine operation, sleeve-type clamps should be checked as outlined in steps *b* and *i* above. Tighten or loosen as required.

j. If engine is not to be operated for some time, place two bags of dehydrating agent in exhaust port of tailpipe section (7, figure 5–29). Seal exhaust port with tape (item 26, table 1–8).

Section V Fuel System

5–67. Description. The fuel system is an open-vent system consisting of a forward fuel tank, center fuel tank, aft fuel tank, engine-driven fuel pumps, main fuel booster pump, fuel transfer pump, fuel selector valve, fuel tank drain valves, fuel system drain valve, fuel level control valve, fuel tank strainers, fuel system screen, and fuel lines and hoses. When the fuel selector valve is placed in ON position, fuel transfer pump switches are energized. The fuel transfer pump switches, marked CTR-OFF and AFT-OFF, are located on the fuel transfer pump switch panel secured to the right side of the radio control console. The fuel transfer pump switches control fuel flow from the center and aft fuel tanks to the forward fuel tank. The main fuel booster pump in the forward fuel tank pumps fuel through the fuel selector valve and the fuel system strainer assembly to the engine-driven fuel pump. When the fuel selector valve is placed in EMER ON position, fuel flows by gravity from all fuel tanks through external tubing directly to the fuel selector valve, then through the fuel system strainer assembly and engine-driven fuel pump to the carburetor. (See figure 5–31.)

5–68. Forward Fuel Tank. The forward fuel tank consists of five interconnected self-sealing fuel cells located in cabin bottom structure beneath the cabin floor. (See figure 5–31.) Three of the fuel cells are installed across the bottom structure under the forward cabin floor panel; the remaining fuel cells are installed aft of the outboard forward fuel cells. All fuel cells are internally interconnected at a flanged hole in adjacent fuel cell walls. All but the forward center fuel cell are externally connected to the tank sump by metal tubes. The tank sump is located in the bottom of the forward center fuel cell. This fuel cell also contains the main fuel booster pump, tank strainer, tank drain valve, and one of the two forward tank fuel quantity tank probes. The second tank probe is located in the aft fuel cell. A level control valve is installed in the forward right fuel cell. Each of the forward right and left fuel cells and the aft fuel cell contains two vent fittings which are connected to overboard vent lines. A fuel overflow detector is installed in the forward left fuel cell vent tube. The forward center fuel cell is vented by two vent fittings connected to each adjacent fuel cell. The aft right fuel cell is vented by two tubes which are routed through the hatch and connected to the aft left fuel cell. An access cover for each forward fuel cell is installed in the forward cabin floor panel. Each aft fuel cell has two access covers in the floor panel over the fuel cell. A filler elbow is installed forward of the cargo door.

5–69. Servicing. Fill forward fuel tank. (Refer to table 1–5.)

5–70. Inspection. a. Inspect fuel cells for security of attachment and indications of leakage.

b. Inspect interconnecting tubes for cracks, corrosion, chafing, loose connections, security of attachment, and indications of leakage.

c. Inspect access covers and filler elbow for security of attachment and indications of leakage.

d. Inspect tank sump for contamination, presence of water, security of attachment, and indications of leakage.

e. Inspect tank strainer for security of attachment and indications of leakage.

f. Inspect tank vent for clogging.

g. Inspect tank drain valve for security of attachment and indications of leakage.

5–71. Center Fuel Tank. The center fuel tank consists of three interconnected bladder-type fuel cells located in the bottom structure beneath cabin floor, just aft of the forward fuel tank. (See figure 5–31.) The three fuel cells are internally interconnected at flanged holes in adjacent fuel cell walls. Each outside fuel cell is externally connected to the tank sump by a metal tube. The tank sump is located in the bottom of

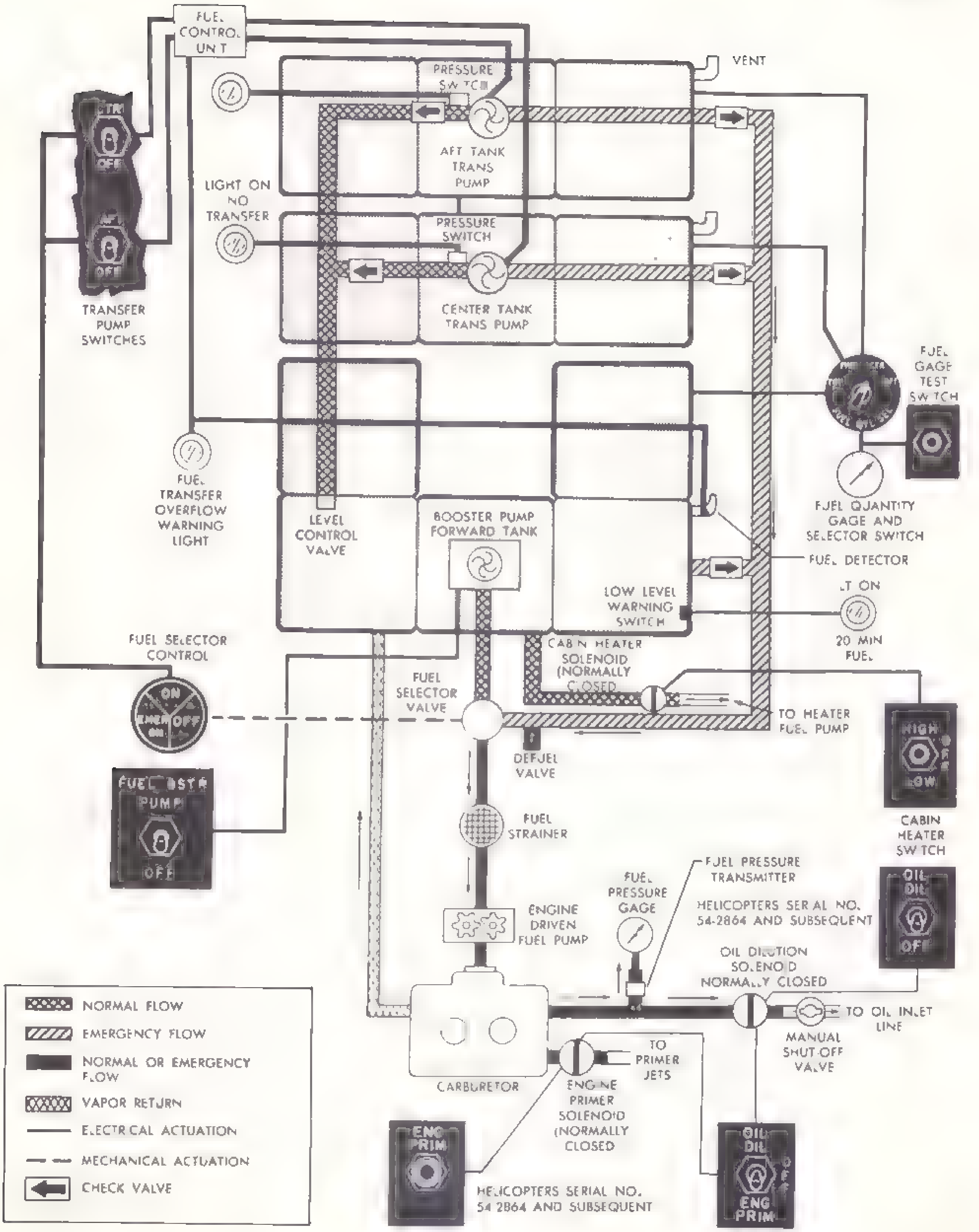


Figure 5—31. Fuel system schematic diagram

the forward center fuel cell. This fuel cell also contains a fuel transfer pump, tank strainer, tank drain valve, a low pressure warning switch, and a fuel quantity tank probe. The left fuel cell contains two vent fittings which are connected to the overboard vent lines; the right fuel cell contains one such fitting. The center fuel cell is vented by two vent fittings connected to each adjacent fuel cell. Two access covers for each fuel cell are installed in the floor panel over the fuel cells. A filler elbow is installed at the right cabin bulkhead aft of the cargo door, and is connected to the aft right corner of the right fuel cell.

5–72. Servicing. Fill center fuel tank. (Refer to table 1–5.)

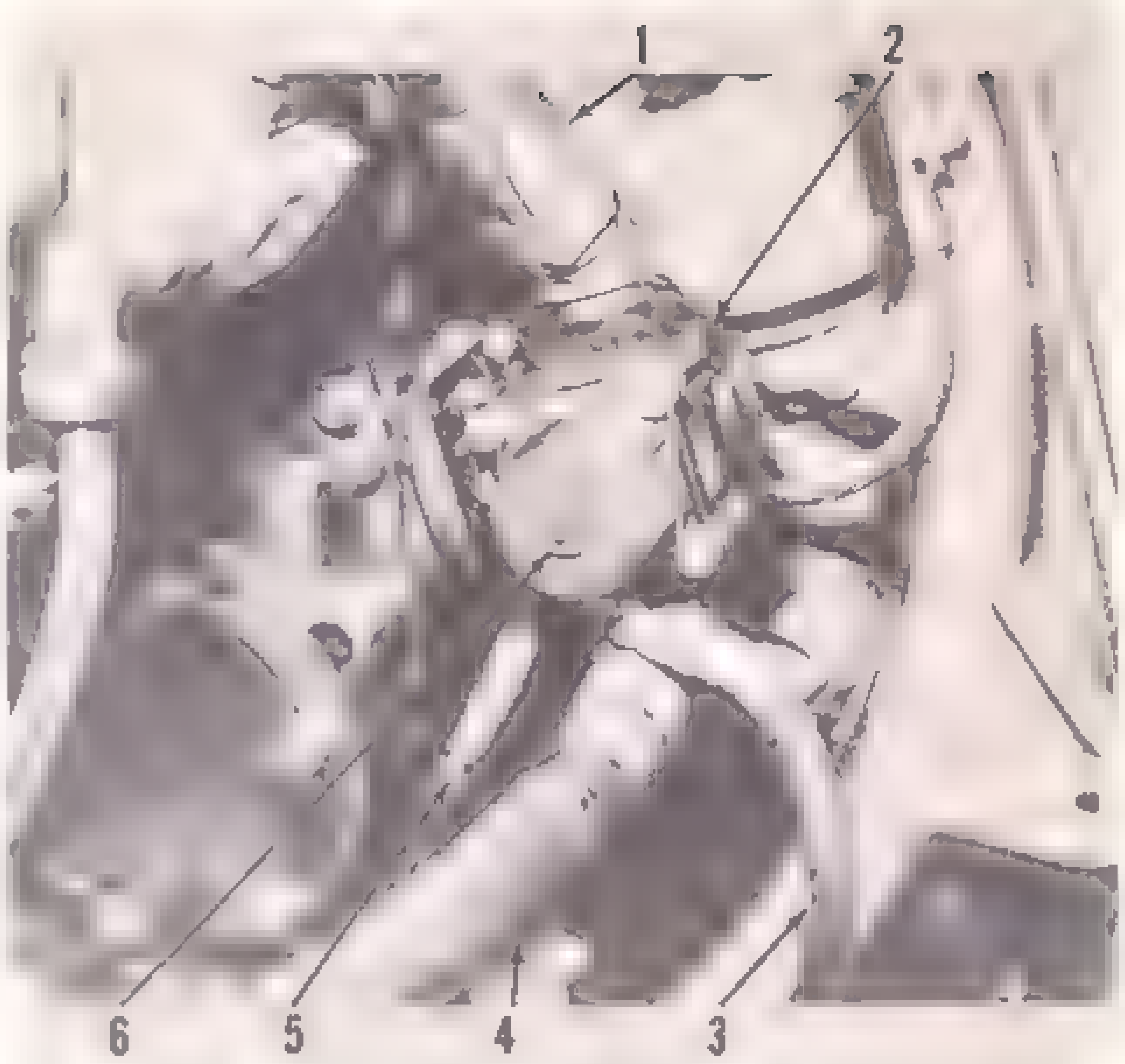
5–73. Inspection. Inspect center fuel tank as outlined in paragraph 5–70.

5–74. Aft Fuel Tank. The aft fuel tank consists of three interconnected bladder-type fuel cells located in the cabin bottom structure beneath the cabin floor, just forward of the cabin aft bulkhead. (See figure 5–31.) The three fuel cells are internally interconnected at flanged holes in the adjacent fuel cell wall. Each outside fuel cell is externally connected to the tank sump. The tank sump is located in the bottom of the center fuel cell. The center fuel cell also contains a fuel transfer pump, tank strainer, tank drain valve, a low pressure warning switch, and a fuel quantity tank probe. Each outside fuel cell contains two vent fittings which are connected to overboard vent lines. The center fuel cell is vented by two vent fittings connected to each adjacent fuel cell. Two access covers for each fuel cell are installed in the floor panel over the fuel cells. A filler elbow is installed at the right cabin wall below and slightly aft of the cabin window, and is connected to the right fuel cell.

5–75. Servicing. Fill aft fuel tank. (Refer to table 1–5.)

5–76. Inspection. Inspect aft fuel tank as outlined in paragraph 5–70.

5–77. Engine-Driven Fuel Pump. A rotary-vane, positive-displacement type, engine-driven fuel pump (2, figure 5–32) is mounted on the drive pad on the right side of the supercharger rear housing. The engine-driven fuel pump incorporates an integral relief valve and is driven by direct coupling with the engine pump drive. Four lines are attached to the engine-driven fuel pump: the fuel inlet line from the fuel system strainer; the fuel outlet line to the carburetor; the fuel drain line which is connected at the mounting flange and leads overboard; and the fuel vent line which is connected at the relief valve housing cover and also leads overboard. The fuel drain line provides a drain for any possible leakage past the seal on the drive shaft



1. Fuel Outlet Line
2. Engine-Driven Fuel Pump
3. Fuel Vent Line
4. Fuel Inlet Line
5. Fuel Drain Line
6. Adjusting Screw

Figure 5–32. Engine-driven fuel pump installation

of the engine-driven fuel pump. The fuel vent line provides positive balance on the relief valve under varying altitude conditions.

5–78. Removal. a. Place BATT and GEN switches in OFF position.

b. Open nose doors.

c. Remove shroud panels (upper and right) as necessary. (Refer to paragraph 5–189.)

d. Disconnect fuel outlet line (1, figure 5–32) and fuel inlet line (4) from elbows on engine-driven fuel pump (2). Install protector plugs in fuel inlet and outlet lines and install protector caps on elbows.

e. Disconnect fuel vent line (3) and fuel drain line (5) from fittings on engine-driven fuel pump (2). Install protector plugs in fuel vent and drain lines and install protector caps on fittings.

f. Remove lock wire, nuts, and washers securing engine-driven fuel pump (2). Disengage bonding jumper from forward mounting stud.

g. Remove engine-driven fuel pump (2) from drive pad.

h. Remove gasket from drive pad and discard. Install protective cover on drive pad.

5–79. Inspection. a. Inspect engine-driven fuel pump for cracks, corrosion, indications of leakage, and loose or damaged components.

b. Inspect locknut at outboard end of relief valve housing for looseness and security of lock wire.

c. Inspect plugs for looseness and security of lock wire.

5—80. Installation. a. Remove protective cover from drive pad and insure that drive pad is clean and free of dents, marks, and abrasions.

b. Position new gasket on drive pad (engine).

c. Lightly coat splines of drive shaft of engine-driven fuel pump and mating splines with grease (item 62, table 1—8).

d. Position engine-driven fuel pump (2, figure 5—32) on drive pad so that relief valve adjusting screw (6) is pointing to rear of supercharger housing.

e. Position end of bonding jumper on forward mounting stud.

f. Secure engine-driven fuel pump (2) with nuts and washers. Tighten nuts to a torque of 150 to 170 inch-pounds. Secure nuts with lock wire.

g. Remove protector plugs and caps, and connect fuel inlet line (4) and fuel outlet line (1) to elbows on engine-driven fuel pump (2). Tighten fuel inlet and outlet lines securely.

h. Connect fuel vent line (3) and fuel drain line (5) to fittings on engine-driven fuel pump (2). Tighten fuel vent and drain lines securely.

i. Pressure check engine-driven fuel pump for leakage.

j. Adjust fuel pressure as outlined in paragraph 5—81.

k. Install shroud panels (upper and right). (Refer to paragraph 5—192.)

l. Close nose doors.

5—81. Adjustment. a. Remove lock wire from locknut securing adjusting screw (6, figure 5—32). Loosen locknut.

b. Start engine in accordance with TM 55-1520-202-10, and idle engine at 1100 rpm.

Warning

Engine operation will be performed by authorized personnel only.

c. Adjust engine-driven fuel pump (2) to deliver 23 to 25 psi fuel pressure by turning adjusting screw (6).

Note

Turn adjusting screw clockwise to increase fuel pressure, and counterclockwise to decrease fuel pressure.

d. After required fuel pressure is obtained, hold adjusting screw in place, and tighten locknut. Secure locknut with lock wire.

Note

When locknut is tightened, fuel pressure may change slightly. It is advisable to take this into consideration when adjustment is made.

e. Stop engine in accordance with TM 55-1520-202-10.

5—82. Main Fuel Booster Pump. The electrically operated main fuel booster pump is mounted on the tank sump in the forward center fuel cell of the forward fuel tank, and pumps fuel from the forward fuel tank to the fuel selector valve. The main fuel booster pump is controlled by a switch, marked FUEL BSTER-OFF, located on the main switch panel in the cabin. A built-in radio noise filter is incorporated in the pump electrical circuit to prevent radio interference. A seal drain fitting is installed on the main fuel booster pump and protrudes through the access cover at the bottom of the helicopter. The main fuel booster pump operates with an output pressure of 19 to 25 psi.

5—83. Inspection. a. Inspect main fuel booster pump for proper operation, security of attachment, and indications of leakage.

b. Inspect electrical leads connected to main fuel booster pump for chafing, damaged insulation, loose connections, bare wires or connections, and security of attachment.

c. Inspect seal drain fitting for security of attachment and indications of leakage.

d. Inspect main fuel booster pump air vent (for electric motor) for indications of leakage and clogging.

e. Inspect housing of main fuel booster pump for cracks.

5—84. Fuel Transfer Pump. An electrically operated fuel transfer pump is mounted on the tank sump in the center fuel cell of both the center and aft fuel tanks. Each fuel transfer pump is controlled individually by one of the FUEL TRANS PUMP switches, marked CTR-OFF and AFT-OFF, in the cabin. These switches, in turn, are energized only when the fuel selector valve control is in the ON position. Both center and aft transfer pumps empty into the forward right fuel cell of the forward fuel tank. The flow of fuel into the forward fuel tank is controlled by a mechanical fuel level control valve. A pressure switch installed in each center and aft fuel tank with each fuel transfer pump will cause the corresponding amber LT ON NO TRANS light adjacent to the CTR-OFF or AFT-OFF pump switch to light if a pressure drop should occur in the fuel transfer pump outlet line. A noise filter is incorporated in each fuel transfer pump electrical circuit to prevent radio interference. A seal drain fitting

is installed in the bottom of each fuel transfer pump and protrudes through the access cover at the bottom of the helicopter. Each fuel transfer pump operates with an output pressure of 5 psi.

5—85. Inspection. a. Inspect fuel transfer pump for proper operation, security of attachment, and indications of leakage.

b. Inspect seal drain fitting for security of mounting and indications of leakage.

c. Inspect fuel transfer pump air vent (for electric motor) for indications of leakage and clogging.

d. Inspect electrical leads connected to fuel transfer pump for chafing, damaged insulation, loose connections, bare wires or connections, and security of attachment.

e. Inspect housing of fuel transfer pump for cracks.

5—86. Fuel Selector Valve. The mechanical, three-position fuel selector valve, marked OFF, ON, and EMER ON, is mounted on a bracket in the fuselage bottom structure, directly beneath the clutch compartment floor near the centerline of the helicopter. Access to the fuel selector valve is provided by a hinged panel at the bottom of the helicopter and a removable door in the clutch compartment floor. The fuel selector valve is operated by a gear box mounted at the side of the fuel selector valve. The fuel outlet line from the main fuel booster pump is connected to an elbow at the top of the fuel selector valve. The emergency fuel system outlet line is connected to a Y-drain connector at the bottom of the fuel selector valve. The Y-drain connector also supports the fuel system drain valve (defuel valve). A flanged fitting at the outlet port of the fuel selector valve connects the fuel selector valve to the fuel system strainer.

5—87. Inspection. a. Inspect fuel selector valve for proper operation, security of attachment, and indication of leakage.

b. Inspect lock wire for security of attachment.

c. Inspect housing of fuel selector valve for cracks and damage.

d. Inspect gear box assembly for security of attachment and loose or damaged components.

e. Inspect mounting bracket of fuel selector valve for cracks, security of attachment, and damage.

f. Inspect inlet elbow, flange fitting, and Y-drain connector for security of attachment, damage, and indications of leakage.

5—88. Fuel Tank Drain Valves. A corrosion-inhibitor cartridge with a fuel drain is installed at each fuel tank sump of the forward fuel tank, center fuel tank, and aft fuel tank to provide a means of drainage for individual fuel tanks. Each fuel drain valve is accessible from beneath the helicopter without removing fuel lines or fairing. On helicopters serial No. 54-2912 and subsequent, an adapter and gasket are installed in place of the corrosion-inhibitor cartridge.

5—89. Inspection. a. Inspect fuel tank drain valve for security of attachment and indications of leakage.

b. Inspect housing of fuel tank drain valve for cracks and damage.

c. Check fuel tank drain valve for proper operation and clogging.

5—90. Fuel System Drain Valve (Defuel Valve). The fuel system drain valve is attached to a Y-drain connector on the bottom of the fuel selector valve. Fuel from the forward fuel tank, center fuel tank, and aft fuel tank is directed to the Y-drain connector through the emergency fuel system tubing. Access to the fuel system drain valve is provided by means of a hinged panel at the bottom of the helicopter.

5—91. Inspection. Inspect fuel system drain valve for cracks, proper operation, security of attachment, damage, and indications of leakage.

5—92. Fuel Level Control Valve. A normally open, mechanical, float-type, fuel level control valve is installed in the right forward right fuel cell of the forward fuel tank at the discharge end of the fuel transfer pump tube. The fuel level control valve prevents the forward fuel tank from being overfilled by the fuel transfer pumps by closing and interrupting the fuel flow.

5—93. Inspection. a. Check fuel level control valve for proper operation.

Note

Fuel will flow to the forward fuel tank until full, then shut off, if the fuel level control valve is operating properly. Fuel will flow from the forward fuel tank vent if the fuel level control valve does not stop the flow of fuel.

b. Gain access to fuel level control valve to inspect as follows:

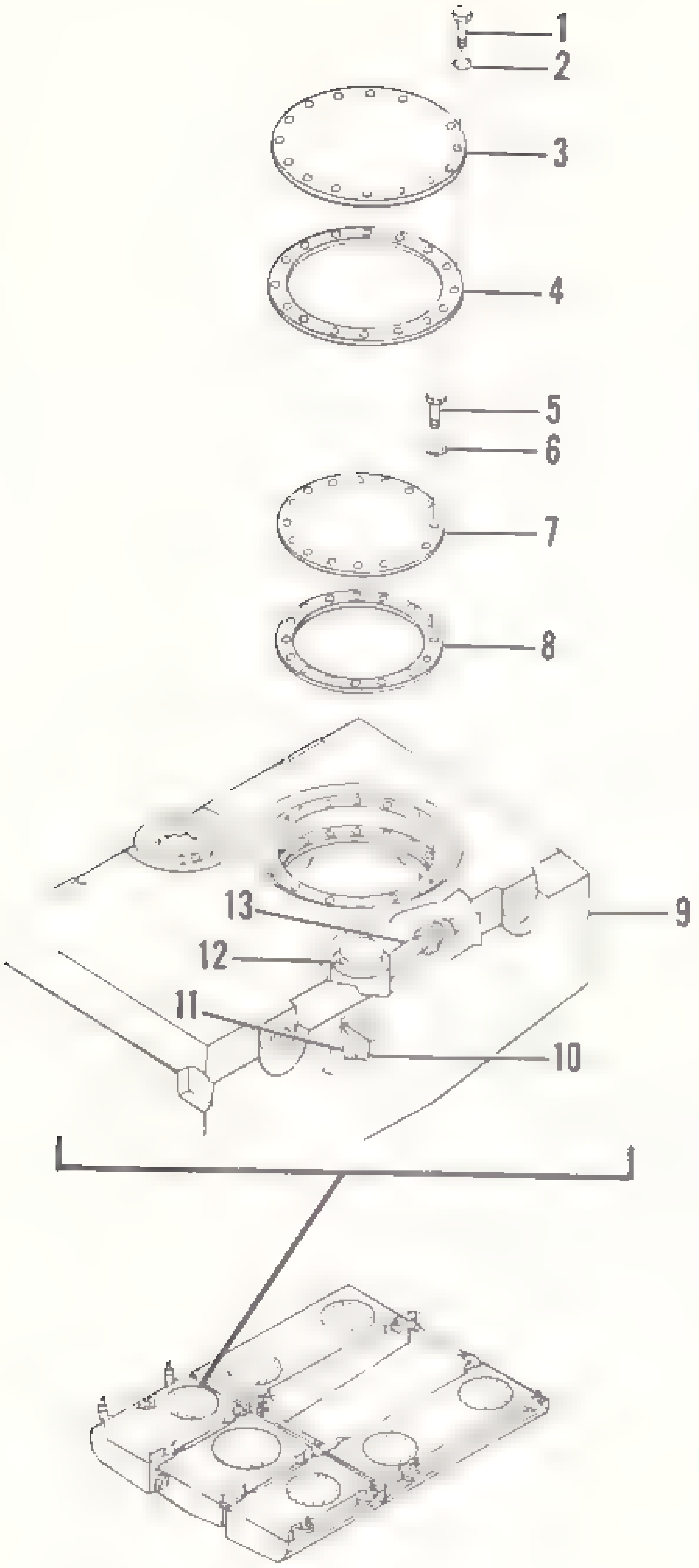
(1) Place BATT and GEN switches in OFF position. Disconnect external power source from external power receptacle.

(2) Drain and purge all fuel tanks.

(3) Place fuel selector valve in OFF position.

(4) Remove bolts (1, figure 5—33), washers (2), and right forward cell access cover (3) from right forward fuel cell (9). Remove gasket (4).

(5) Remove bolts (5) and washers (6) securing right forward cell cover (7). Remove right forward cell cover and gasket (8).



1. Bolt
2. Washer
3. Right Forward Cell Access Cover
4. Gasket
5. Bolt
6. Washer
7. Right Forward Cell Cover
8. Gasket
9. Right Forward Fuel Cell
10. Swivel Elbow
11. Attaching Bracket
12. Fuel Level Control Valve
13. Transfer Pump Tube

Figure 5—33. Fuel level control valve installed

c. Inspect fuel level control valve for cracks, corrosion, security of attachment, loose or improperly connected fuel transfer pump tube, and damage.

d. After inspection is completed, secure access covers as follows:

(1) Install new gasket (8) and right forward cell cover (7) on right forward fuel cell (9) and secure with bolts (5) and washers (6). Secure bolts with lock wire.

(2) Install new gasket (4) and right forward cell access cover (3), and secure with bolts (1) and washers (2). Secure bolts with lock wire.

(3) Fill fuel tanks. (Refer to table 1—5.)

5—94. Fuel Tank Strainers (Typical). A finger-type fuel tank strainer is installed in the strainer housing that is attached to the bottom of each fuel tank sump of the forward fuel tank, center fuel tank, and aft fuel tank. The fuel tank strainers filter the emergency system fuel.

5—95. Removal. Removal procedure is the same for each fuel tank strainer in the forward fuel tank, center fuel tank, and aft fuel tank. Remove fuel tank strainer as follows:

a. Place BATT and GEN switches in OFF position. Disconnect external power source from external power receptacle.

b. Place fuel selector valve in OFF position.

c. Drain and purge all fuel tanks.

d. Remove access panel from bottom of helicopter beneath fuel tank sump from which strainer (1, figure 5—34) is to be removed.

e. Remove lock wire from plug (4).

f. Remove plug (4), gasket (3), spring (2), and strainer (1) from housing strainer on fuel tank sump.

5—96. Cleaning. Clean fuel tank strainer with solvent (item 4, table 1—8).

Note

Remove any foreign material from screen mesh of fuel tank strainer, using filtered, compressed air. Insure that sealing compound is removed from collar of strainer.

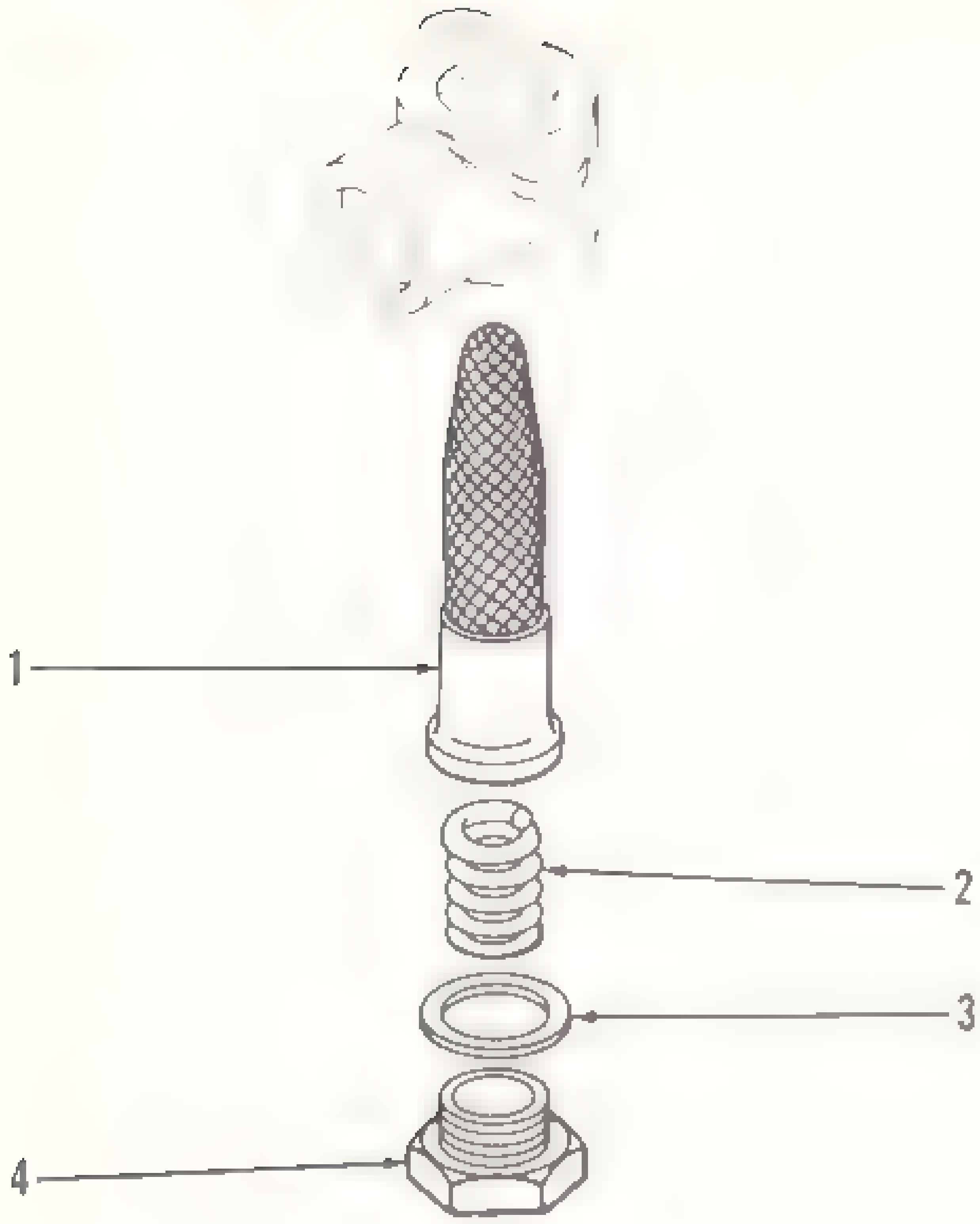
5—97. Inspection. a. Inspect strainer for corrosion, cracks, and holes.

b. Inspect screen mesh for security of attachment.

c. Inspect plug for damaged threads, corrosion, and cracks.

d. Inspect spring for cracks, corrosion, and resiliency.

5—98. Installation. Installation procedure is the same for each fuel tank strainer in the forward fuel tank, center fuel tank, and aft fuel tank. Install fuel tank strainer as follows:



1. Strainer
2. Spring
3. Gasket
4. Plug

Figure 5–34. Fuel tank strainer (typical)

a. Apply a coat of adhesive (item 41, table 1–8), or equivalent, to inside and outside surfaces of collar section of strainer.

Caution

Do not apply adhesive to outer upper ring of collar.

b. Allow adhesive to dry for 2 hours, then apply a second coat to both surfaces and allow to air-dry for 24 hours.

c. Insert strainer (1, figure 5–34) into strainer housing on fuel tank sump, and push strainer up until it bottoms against beveled shoulder inside strainer housing.

Caution

Remove all excess adhesive that may protrude into strainer housing after insertion of strainer with a pointed wooden dowel or similar object. Do not use a metal object.

d. Insert spring (2) into strainer housing.

e. Position new gasket (3) on plug (4). Install plug in strainer housing and secure with lock wire.

f. Fill fuel tanks. (Refer to table 1–5.)

g. Check for indications of leakage around plug (4).

h. Install access panel.

5–99. Fuel System Screen. The wire-mesh fuel system screen filters all fuel prior to entry into the engine-driven fuel pump, and is an integral part of the fuel system strainer assembly. The fuel system screen is installed inside the fuel system strainer assembly that is mounted on a bracket assembly in the fuselage bottom structure, directly beneath the clutch compartment floor and near the centerline of the helicopter. Access to the fuel system strainer assembly is provided by a hinged panel at the bottom of the helicopter and a removable door in the clutch compartment.

5–100. Removal. a. Place BATT and GEN switches in OFF position. Disconnect external power source from external power receptacle.

b. Place fuel selector valve in OFF position.

c. Loosen fasteners in hinge panel below fuel system strainer assembly and swing hinge panel down.

d. Open drain valve on fuel system strainer assembly and drain residual fuel into a suitable container.

e. Remove lock wire from wing nuts (6, figure 5–35). Loosen wing nuts until cap (4) is free of body (1).

Note

The first threads of the cap mounting studs are staked to prohibit removal of washers (5) and wing nuts (6).

f. Pull cap (4) straight down from body (1) until pin in cap is disengaged from body.

g. Remove cap (4) by turning counterclockwise until lugs are clear of mounting studs. Remove gasket (3) from cap.

h. Remove screen (12) from body (1).

5–101. Cleaning. Clean fuel system screen with solvent (item 4, table 1–8) and dry thoroughly.

Note

Remove any foreign material from screen mesh by directing a flow of filtered, compressed air opposite to normal fuel flow.

5–102. Inspection. a. Inspect fuel system screen for corrosion, cracks, holes, and distortion.

b. Inspect screen mesh for security of attachment.

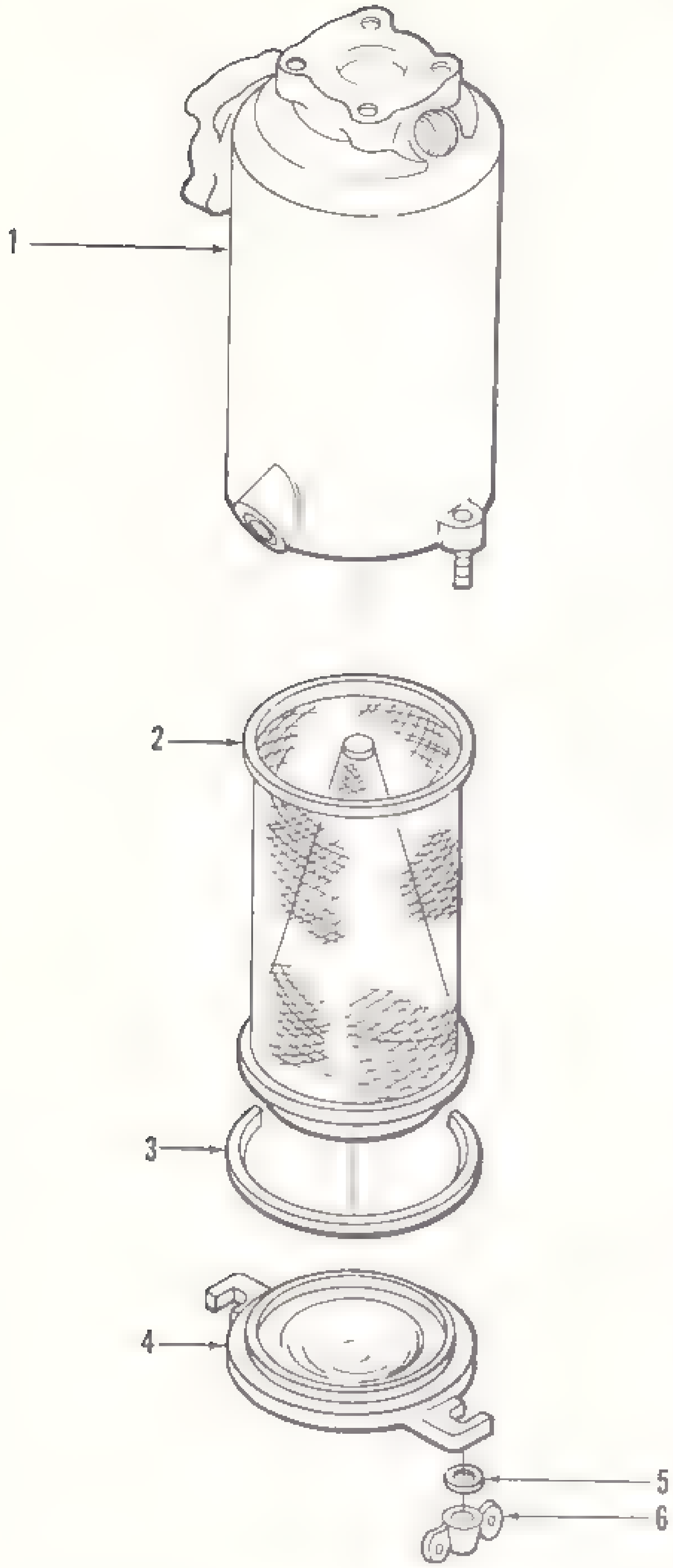
5–103. Installation. a. Position new gasket (3, figure 5–35) on cap (4).

b. Insert screen (2) into body (1) until it bottoms on flange in top of body.

c. Engage lugs of cap (4) with mounting studs on body (1).

Note

Insure that washers (5) are between lugs on cap (4) and wing nuts (6).



1. Body
2. Screen
3. Gasket
4. Cap
5. Washer
6. Wing Nut

Figure 5—35. Fuel system screen

d. Align pin on cap (4) with hole in body (1), and push cap up against body until it bottoms. Secure cap in place with wing nuts (6).

e. Tighten wing nuts (6) securely and secure with lock wire.

f. Place fuel selector valve in ON position and pressure check fuel system screen installation for leakage.

g. Swing up hinge panel below fuel system strainer assembly and secure with fasteners.

5—104. Fuel Lines and Hoses. Fuel lines (tube assemblies) and hoses are utilized to transfer fuel from the fuel system strainer to the carburetor via the engine-driven fuel pump. Several small hoses on the carburetor return vaporized fuel back into the main fuel system. The fuel hoses are installed on the left side of the engine shroud panel and are identified by fuel identification tape. (See figure 5—36.)

5—105. Removal. All fuel lines and hoses are similarly constructed, except for physical size, and are mounted similarly; therefore, to remove desired fuel line or hose, remove coupling nut at both ends, remove any clamps that may be used to secure fuel line or hose in place, and remove fuel line or hose.

5—106. Cleaning. Clean fuel lines and hoses with solvent (item 4, table 1—8).

5—107. Inspection. a. Inspect fuel lines (tube assemblies) for cracks, corrosion, distortion, damaged threads, crimping, and chafing.

b. Inspect hoses for fraying, cuts, chafing, damaged threads, and indications of leakage.

5—108. Installation. All fuel lines and hoses are similarly installed. Secure coupling nuts at both ends of fuel line or hose and secure in place, as necessary, with clamps.

Note

Prior to installing fuel lines and hoses, apply grease (item 63, table 1—8) lightly to threads of coupling nuts.

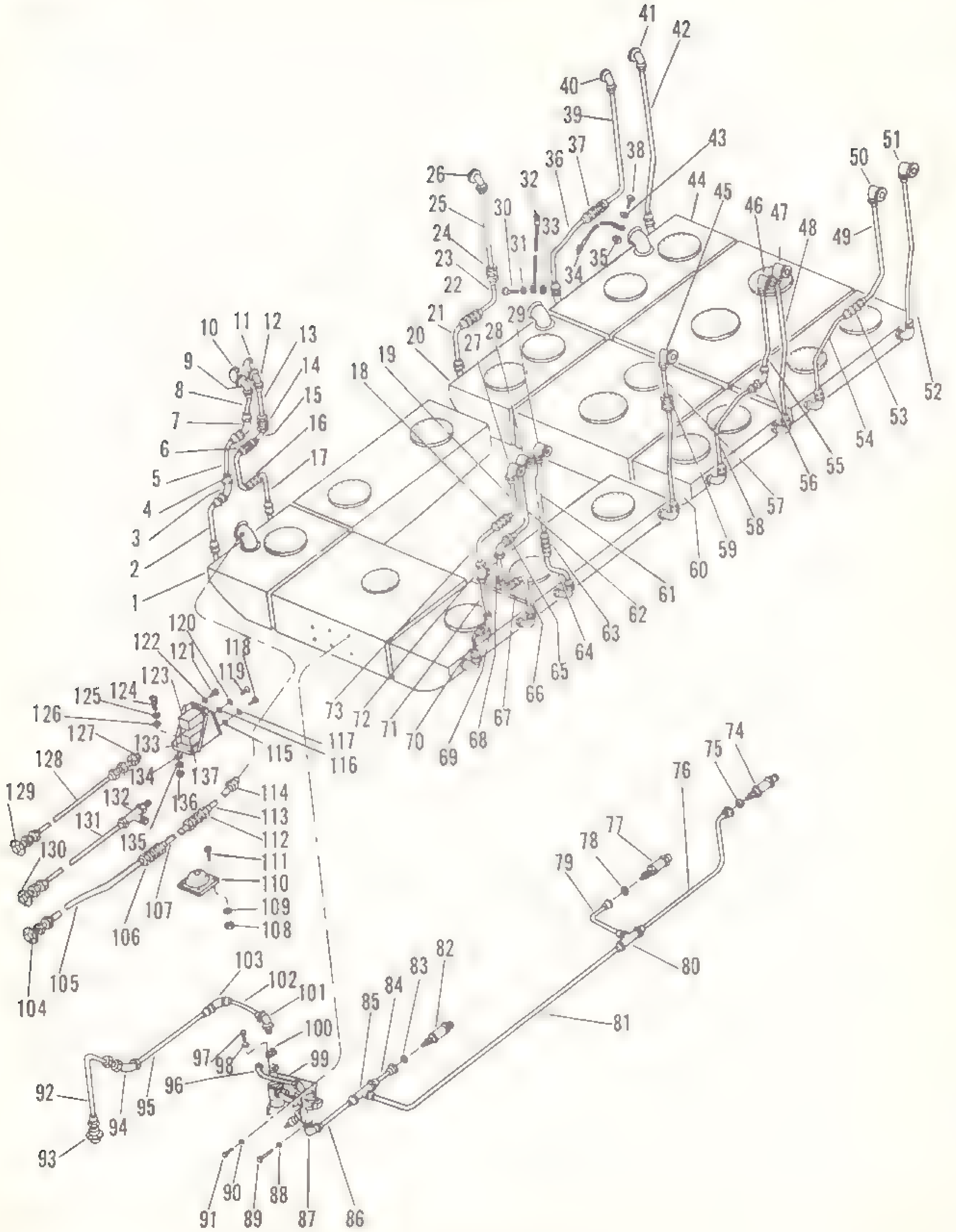


Figure 5—36. Fuel lines and hoses (Sheet 1 of 2)

1. Cell Installation
2. Tube Assembly
3. Nut
4. Tube Assembly
5. Tube Assembly
6. Nut
7. Nut
8. Tube Assembly
9. Fitting
10. Fitting
11. Fitting
12. Nut
13. Tube Assembly
14. Union
15. Tube Assembly
16. Nut
17. Tube Assembly
18. Nut
19. Tube Assembly
20. Cell Installation
21. Tube Assembly
22. Nut
23. Tube Assembly
24. Union
25. Tube Assembly
26. Fitting
27. Fitting
28. Fitting
29. Fitting
30. Screw
31. Washer
32. Bonding Jumper
33. Washer
34. Bonding Jumper
35. Nut
36. Tube Assembly
37. Nut
38. Screw
39. Tube Assembly
40. Fitting
41. Fitting
42. Tube Assembly
43. Washer
44. Cell Installation
45. Fitting
46. Fitting
47. Fitting
48. Tube Assembly
49. Tube Assembly
50. Fitting
51. Fitting
52. Tube Assembly
53. Nut
54. Tube Assembly
55. Tube Assembly
56. Nut
57. Tube Assembly
58. Tube Assembly
59. Union
60. Tube Assembly
61. Tube Assembly
62. Tube Assembly
63. Union
64. Tube Assembly
65. Nut
66. Tube Assembly
67. Nut
68. Tube Assembly
69. Nut
70. Tube Assembly
71. Tube Assembly
72. Fuel Detector
73. Tube Assembly
74. Fuel Check Valve
75. Gasket
76. Tube Assembly
77. Fuel Check Valve
78. Gasket
79. Tube Assembly
80. Tee
81. Tube Assembly
82. Fuel Check Valve
83. Gasket
84. Tube Assembly
85. Tee
86. Tube Assembly
87. Nut
88. Washer
89. Bolt
90. Washer
91. Bolt
92. Hose Assembly
93. Half Coupling
94. Nut
95. Tube Assembly
96. Tube Assembly
97. Bolt
98. Washer
99. Valve and Strainer Assembly
100. Gasket
101. Elbow
102. Tube Assembly
103. Nut
104. Half Coupling
105. Hose Assembly
106. Nut
107. Tube Assembly
108. Nut
109. Washer
110. Vibration Isolator
111. Screw
112. Nut
113. Tube Assembly
114. Union
115. Washer
116. Washer
117. Washer
118. Screw
119. Screw
120. Washer
121. Screw
122. Washer
123. Oil Pressure Transmitter
124. Screw
125. Washer
126. Washer
127. Gasket
128. Oil Pressure Hose Assembly
129. Half Coupling
130. Half Coupling
131. Fuel Pressure Hose Assembly
132. Nut
133. Bracket Assembly
134. Washer
135. Washer
136. Nut
137. Fuel Pressure Transmitter

Figure 5—36. Fuel lines and hoses (Sheet 2 of 2)

Section VI Oil System

5—109. Description. The oil system consists of magnetic chip detector plugs and strainers, oil strainer assembly, rear oil pump, front oil pump, oil cooler assembly, oil cells (oil tanks), oil dilution system, a drain valve in each sump of each oil cell, a system drain valve, a swing check valve, and necessary tubes and hose lines to convey oil from the oil cells to the engine and back to the oil cells. The oil flows by gravity through an interconnecting tube between the oil cells to the system drain valve and swing check valve, and then through the engine inlet hose line to the engine rear oil pump. Oil from the engine is carried by the engine outlet hose line to the oil cooler assembly, and then by a second interconnecting tube to the oil cells. The system drain valve drains most of the oil from the oil cells. The oil cell drain valves provide for draining of the oil cell sumps. A large hex-head plug at the forward right corner of the oil cooler assembly drains the cooler and the attached tube. A drain is provided in the engine front oil sump and supercharger rear housing for draining oil from the engine. The engine inlet and outlet hose lines are drained by disconnecting one end of each line. The swing check valve prevents drainage of oil from the engine when the engine is idle. An overboard breather line is attached to the oil separator pad on the crankcase front section of the engine. A vent line extends from the engine aft to the cover of the right oil cell, and then across to the cover of the left oil cell. The clutch oil pump is mounted on the cover of the left oil cell. (See figures 5—37 and 5—38.)

Caution

The engine must be preoiled immediately prior to starting after an engine change, after the engine has been idle for more than 72 hours or after air has been allowed to enter the oil inlet to the engine in any manner, and after an oil change.

5—110. Analyzing Oil Strainers and Magnetic Chip Detector Plugs. a. Foreign particles found inside either scavenge strainer or on either magnetic chip detector plug have come directly from inside the engine. Anything found on the pressure (inlet) strainer has come directly from the oil supply tank. These particles must be analyzed, however, to determine whether they are from a dirty oil tank or are fine enough to have passed through a scavenge strainer to the supply tank and back to the engine.

b. The oil flow through the scavenge strainers is from inside outward, which explains the dirt collecting on the inside unless the dirt is fine enough to pass through the discs. Ferrous (iron) particles will usually collect on magnetic chip detector plugs. The magnetic chip detector plugs are screwed directly into the end of the scavenge strainers.

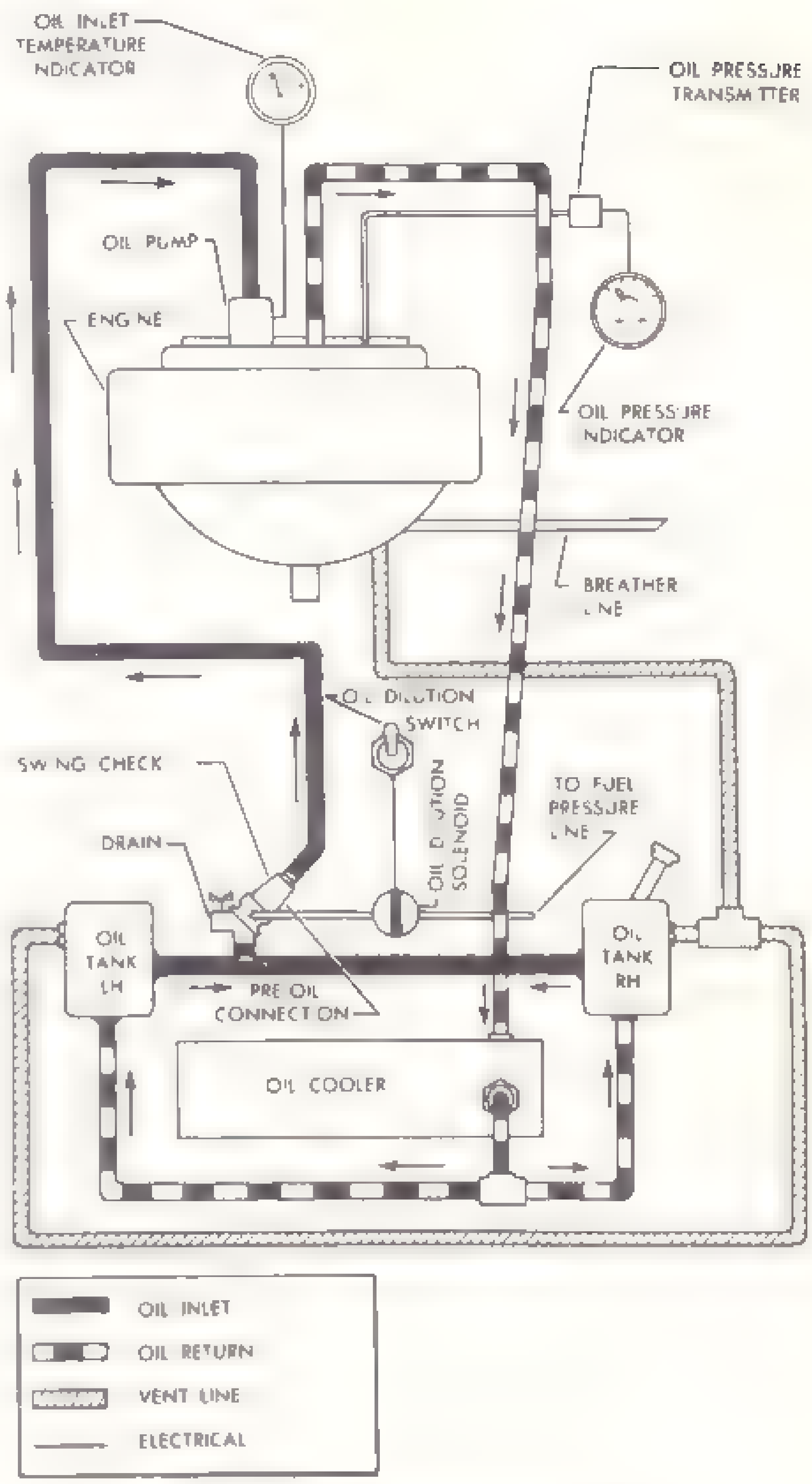


Figure 5—37. Oil system schematic diagram

c. All oil entering the engine from the supply tank, after passing through the pressure pump and inlet check valve, surrounds the pressure (inlet) strainer. It flows through the strainer from the outside inward. It leaves the strainer from the inner end; therefore, foreign particles stopped by the strainer will be found on its outside, unless clogging of the strainer has caused the oil to go through the strainer bypass valve.

d. Generally, with the R1820-84A and C engines, it can be assumed that foreign particles found in the front scavenge oil pump strainer or on its magnetic chip detector plug have come from the crankcase front sec-

Figure 5–38. Oil system flow chart (engine)

tion or from the crankcase main section. Anything found in the supercharger rear housing scavenge strainer or on its magnetic chip detector plug is usually from the rear section of the engine.

e. Analyze anything caught by the oil strainers or magnetic chip detector plugs as a possible indication of internal engine trouble. Silver flakes or chips may be distinguished from aluminum by the fact that small particles of aluminum will quickly dissolve in a strong caustic solution (50 percent sodium hydroxide). Clean strainers and magnetic chip detector plugs by soaking them in a container of gasoline (item 64, table 1–8). Flush and drain the strainers thoroughly before reinstalling in the engine. Always use new oil seals each time these parts are installed.

5–111. Magnetic Chip Detector Plugs and Strainers. The magnetic chip detector plugs and strainers are used to arrest the circulation of detrimental foreign particles in the lubrication system and to provide an accessible place to analyze the internal conditions of engine metal. A magnetic chip detector plug and a strainer are located in the front oil sump; a strainer is located in the rocker box drain sump; and a strainer and magnetic chip detector plug are located in the supercharger rear housing. In the supercharger rear housing installation, the strainer is installed in the supercharger rear housing, and the magnetic chip detector plug is installed in the strainer. (See figure 5–39.)

5–112. Removal. a. Disconnect electrical wire from magnetic chip detector plug (1, figure 5–39), and remove lock wire. Remove magnetic chip detector plug from front oil sump and drain lubricant into a suitable container. Remove gasket from magnetic chip detector plug and discard. (See figure 5–16.)

Note

After removal of magnetic chip detector plug, check for metallic particles and foreign matter.

b. Disconnect electrical wire from magnetic chip detector plug, located in supercharger rear housing strainer, and remove lock wire. Remove magnetic chip detector plug and drain lubricant into a suitable container. Remove gasket from magnetic chip detector plug and discard. (See figure 5–40.)

Note

After removal of magnetic chip detector plug, check for metallic particles and foreign matter.

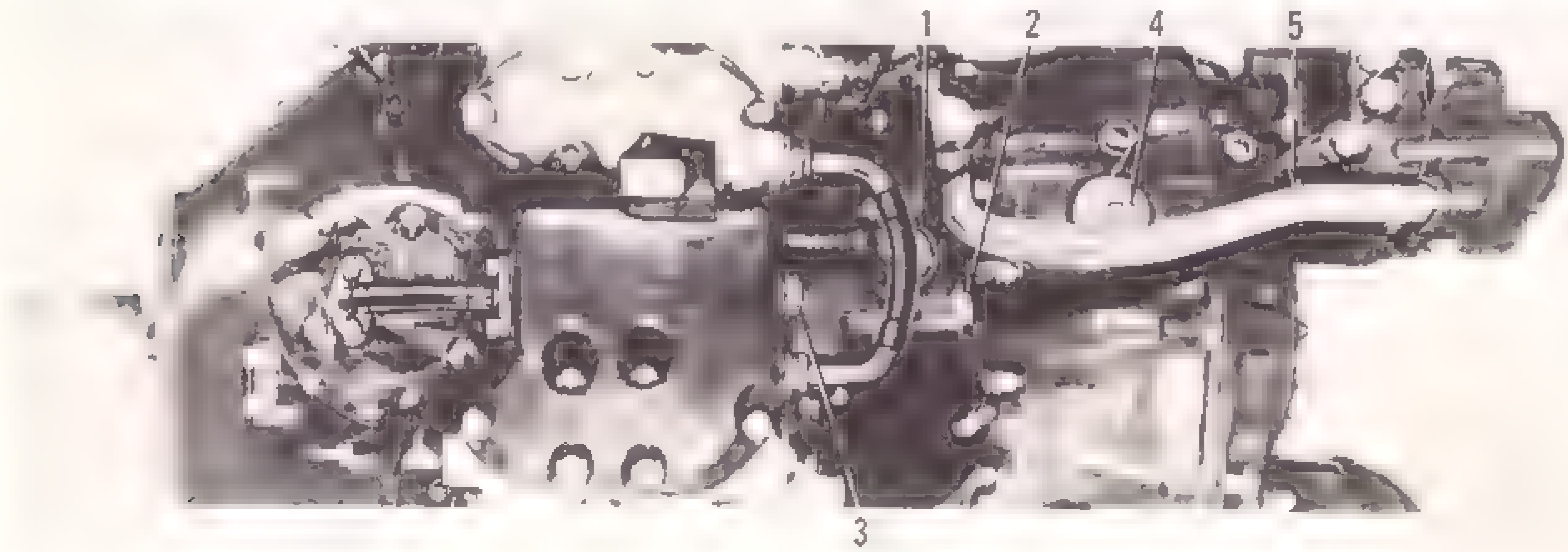
c. Remove strainer from supercharger rear housing. Remove gasket from strainer and discard. (See figure 5–41.)

d. Remove lock wire securing oil sump strainer (2, figure 5–39). Remove oil sump strainer from front oil sump, and drain lubricant into a suitable container. Remove gasket from oil sump strainer and discard. (See figure 5–17.)

e. Remove lock wire securing rocker box drain sump strainer (3, figure 5–39). Remove rocker box drain sump strainer and drain lubricant into a suitable container. Remove gasket from rocker box drain sump strainer and discard. (See figure 5–18.)

5–113. Cleaning. Clean magnetic chip detector plugs and strainers by soaking in a container of gasoline (item 64, table 1–8). After soaking, flush, drain thoroughly, and allow to air-dry.

5–114. Inspection. Inspect magnetic chip detector plugs and strainers for corrosion, damaged threads, distortion, and cleanliness.



1. Magnetic Chip Detector Plug
2. Oil Sump Strainer
3. Rocker Box Drain Sump Strainer
4. Supercharger Rear Housing Strainer and Magnetic Chip Detector Plug
5. External Scavenge Oil Line

Figure 5–39. Bottom view of engine showing location of magnetic chip detector plugs and strainers

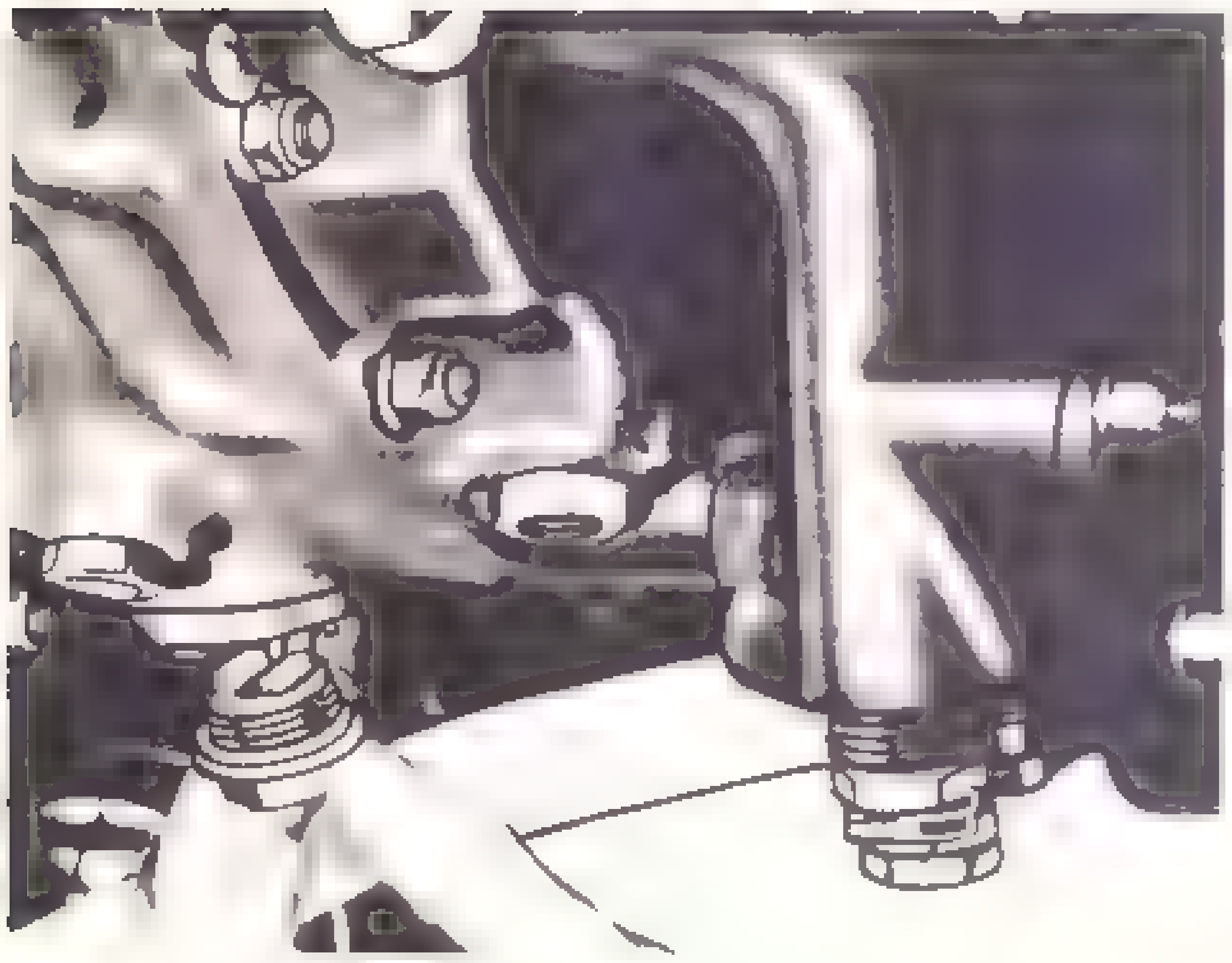


Figure 5–40. Removing magnetic chip detector plug from supercharger rear housing

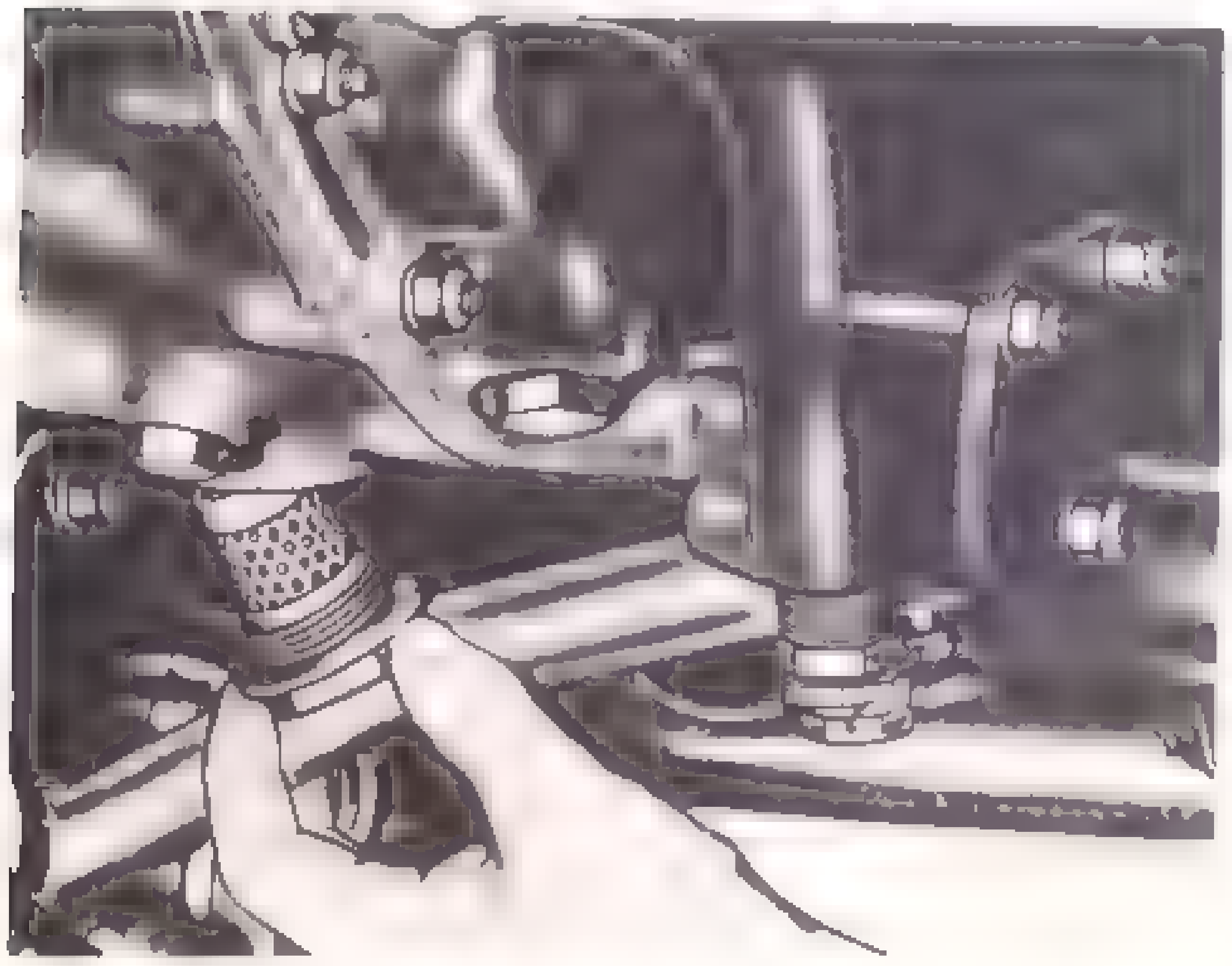


Figure 5–41. Removing supercharger rear housing scavenger strainer

5–115. Installation. a. Position new gasket on oil sump strainer (2, figure 5–39) and install oil sump strainer in front oil sump. Secure oil sump strainer with lock wire. (See figure 5–17.)

b. Position new gasket on rocker box drain sump strainer (3, figure 5–39). Install rocker box drain sump strainer and secure with lock wire. (See figure 5–18.)

c. Position new gasket on supercharger rear housing strainer and install supercharger rear housing strainer. (See figure 5–41.)

d. Position new gasket on magnetic chip detector plug (1, figure 5–39) and install magnetic chip detector plug in front oil sump. Secure magnetic chip detector plug with lock wire and connect electrical wiring. (See figure 5–16.)

e. Position new gasket on magnetic chip detector plug (supercharger rear housing) and install magnetic chip detector plug in supercharger rear housing strainer. Secure magnetic chip detector plug with lock wire and connect electrical wiring. (See figure 5–40.)

5–116. Oil Strainer Assembly. The oil strainer assembly, mounted on the left side of the supercharger rear housing and extending into a cavity in a forward projection of the supercharger rear cover, filters pressurized engine oil after it leaves the oil pump. Oil enters the oil strainer assembly through holes in the strainer body, passes through strainer elements (fine mesh screens), and continues to the inside of the oil strainer assembly. The engine oil leaves the outer end of the oil strainer assembly and enters an annulus surrounding the accessory drive and starter bushing, located at the center of the supercharger rear cover. The strainer assembly outlet to the engine incorporates a spring-loaded, ball-type relief valve through which oil may flow in case the strainer elements become clogged or oil is very viscous.

5–117. Removal. a. Open nose doors.

b. Remove nuts and washers securing oil strainer assembly to supercharger rear housing.

c. Install puller, part No. 923071, FSN 5120-490-7259, and remove oil strainer assembly. (See figure 5–42.)

d. Remove gasket from strainer mounting pad and discard.

e. Remove packing from groove on inside of strainer cavity and discard. (See figure 5–43.)

5–118. Disassembly. a. Remove lock wire and remove puller screw, washer, and packing that secure element assembly and housing to cover. Remove element assembly and housing from cover. Separate element assembly from housing.

b. Remove strainer relief valve, located at side of body of element assembly, as follows:

(1) Apply pressure to spring retaining disc and remove lock ring that secures spring retaining disc, spring, and ball. (See figure 5–44.)

(2) Slowly release pressure on spring retaining disc until spring tension is negligible. Remove spring retaining disc, spring, and ball from body. (See figure 5–44.)

c. Install fixture (assembling and disassembling), part No. 809968, FSN 2810-474-3120, in a suitable vise. Install element assembly in fixture.

d. Compress strainer elements by tightening handle on fixture just enough to permit removal of lock ring. Remove lock ring. (See figure 5–45.)

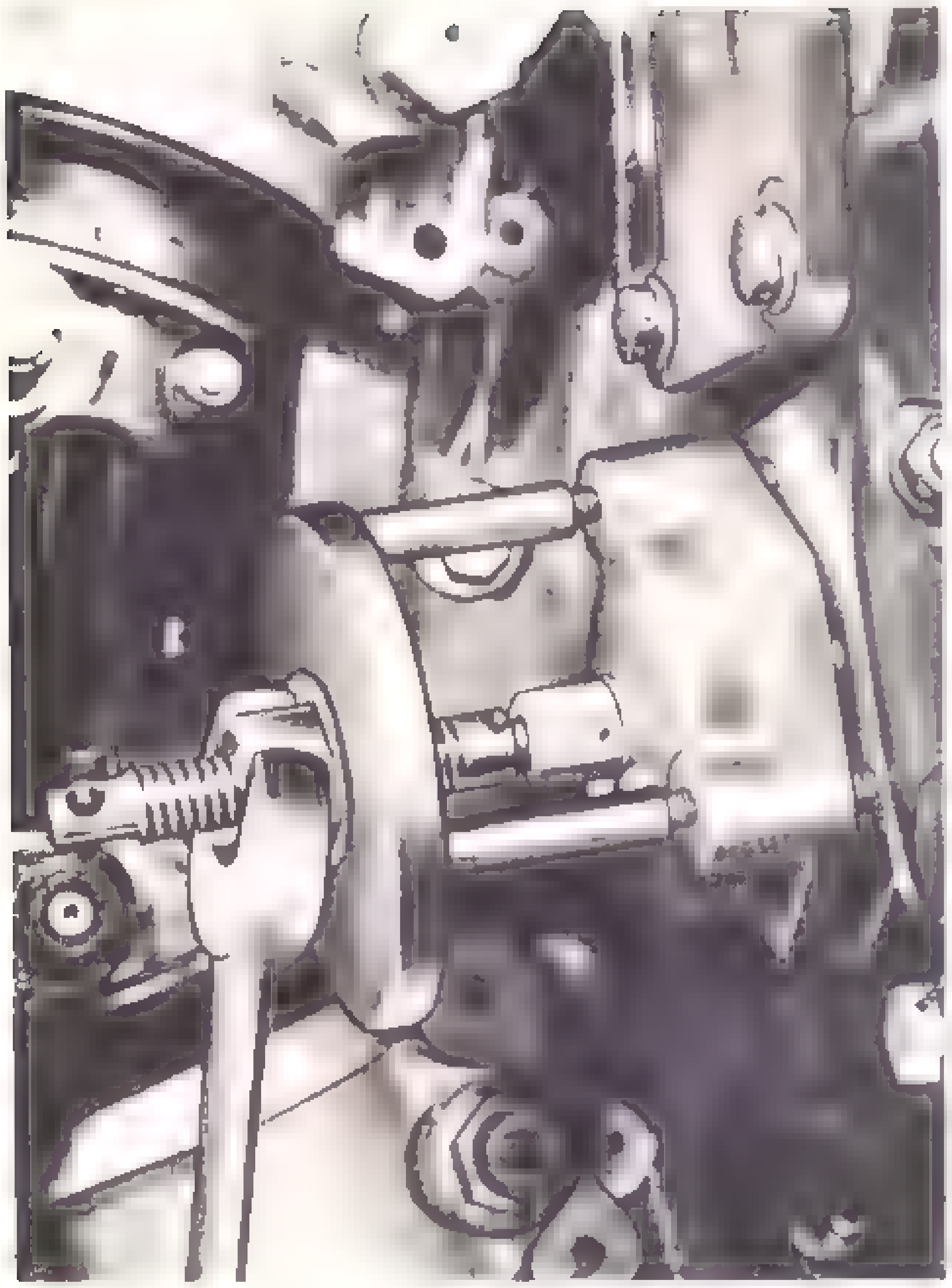


Figure 5—42 Pulling oil strainer assembly

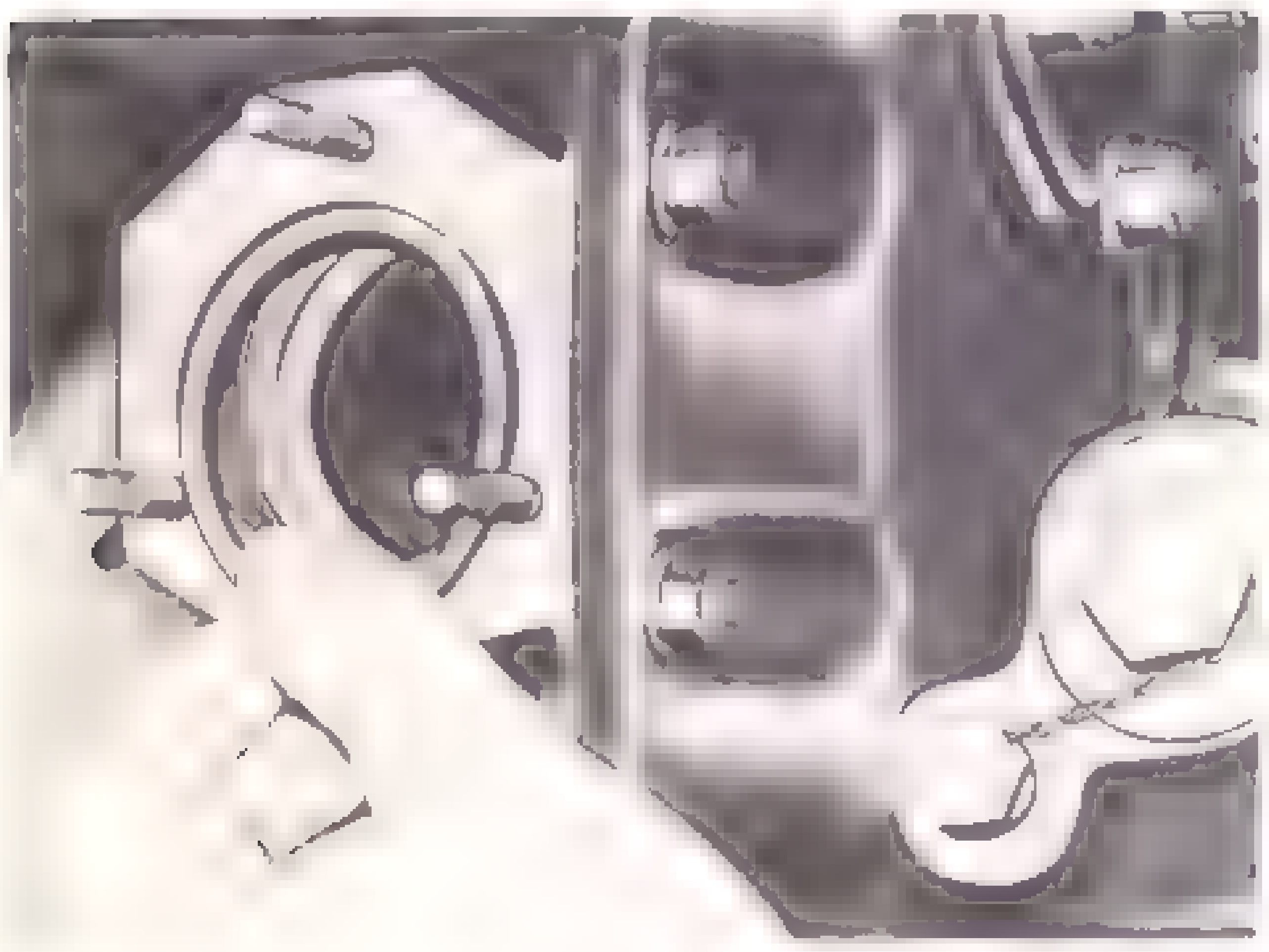


Figure 5—43. Removing packing from strainer cavity

e. Install screw and sleeve of fixture into threads of retainer. Align flat of screw and sleeve with flat of retainer. (See figure 5—46.)

Note

Tighten screw and sleeve handtight.

f. Loosen handle retaining element assembly in fixture and remove element assembly from fixture.

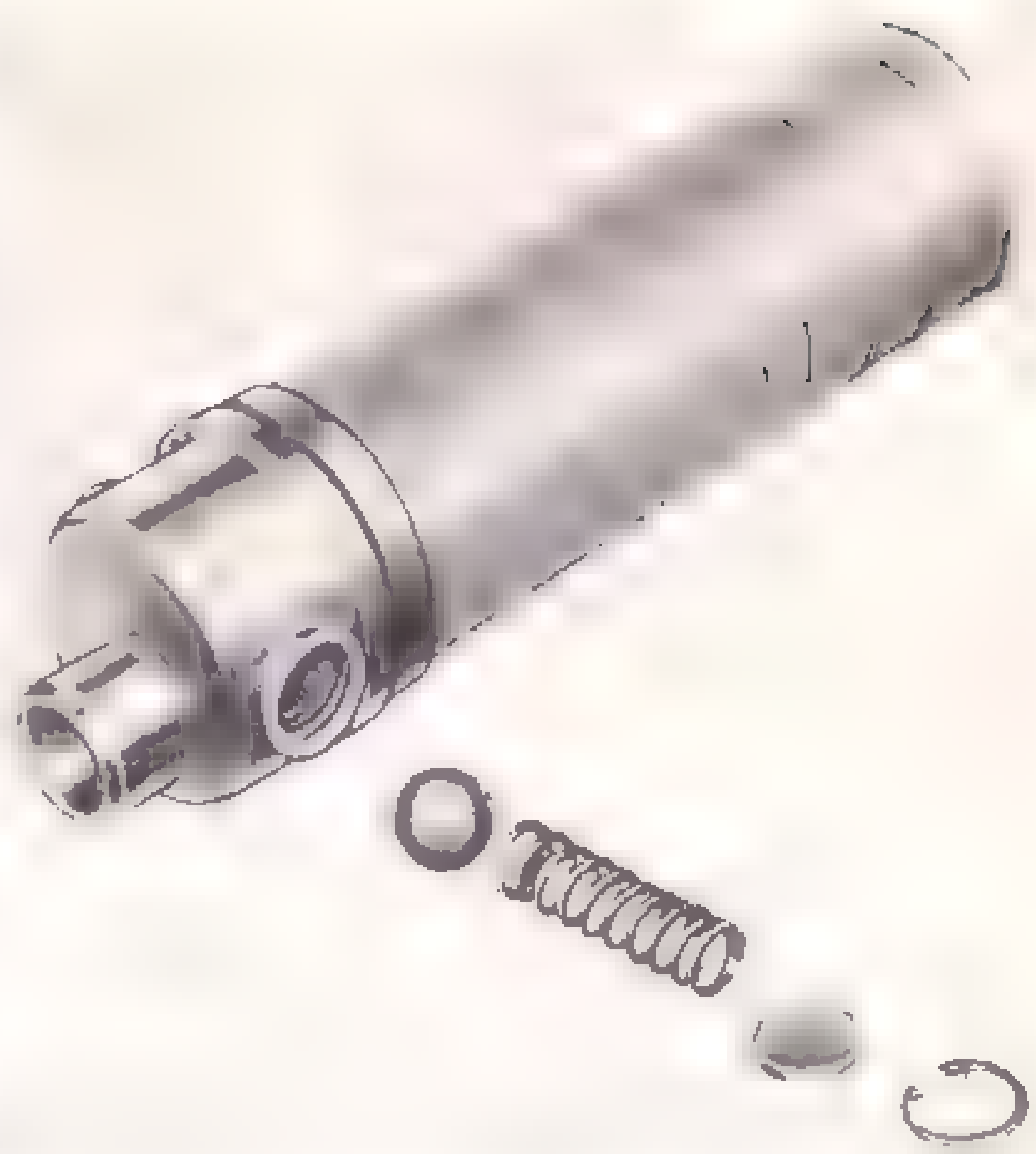


Figure 5—44 Strainer relief valve

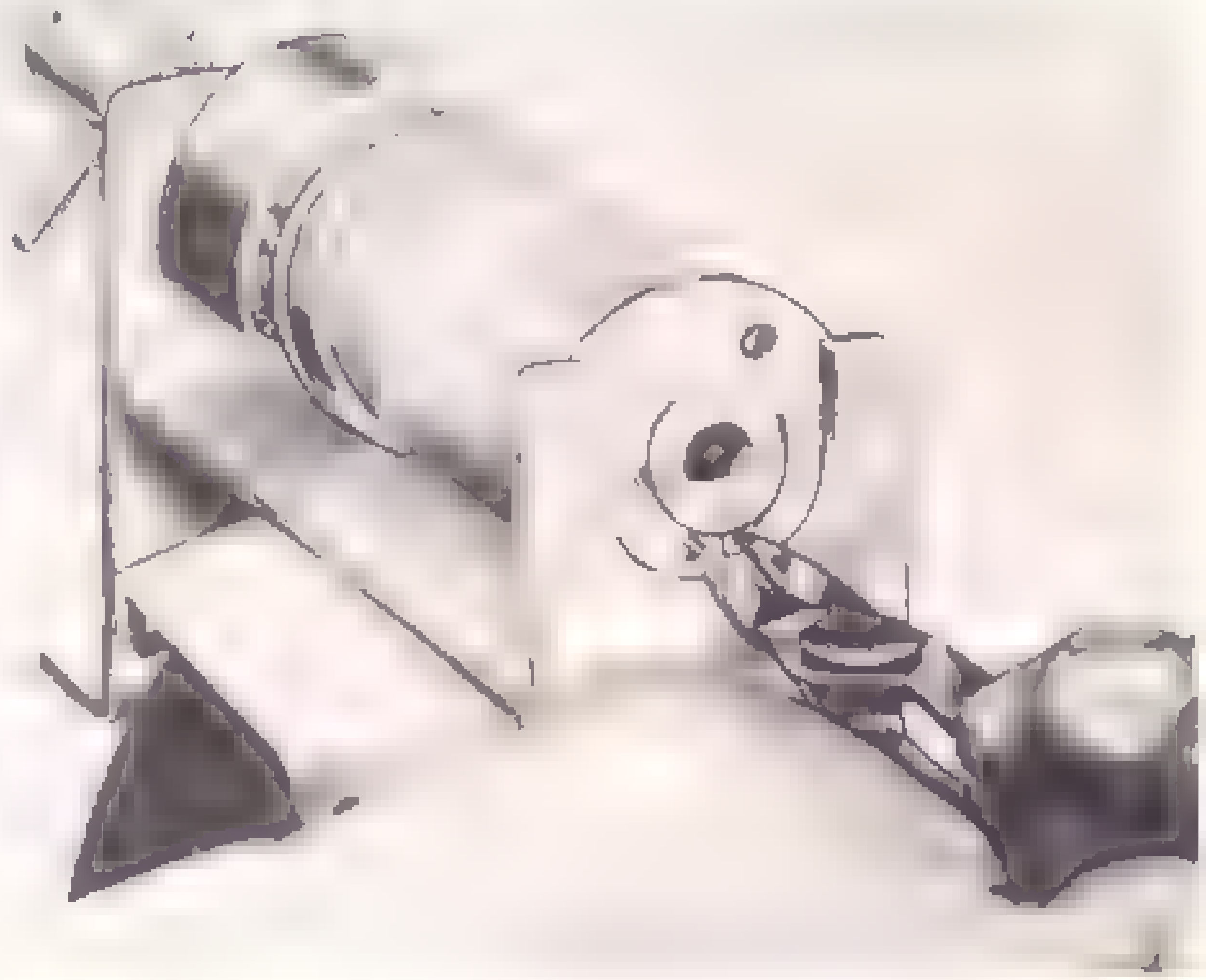


Figure 5—45. Removing lock ring from element assembly

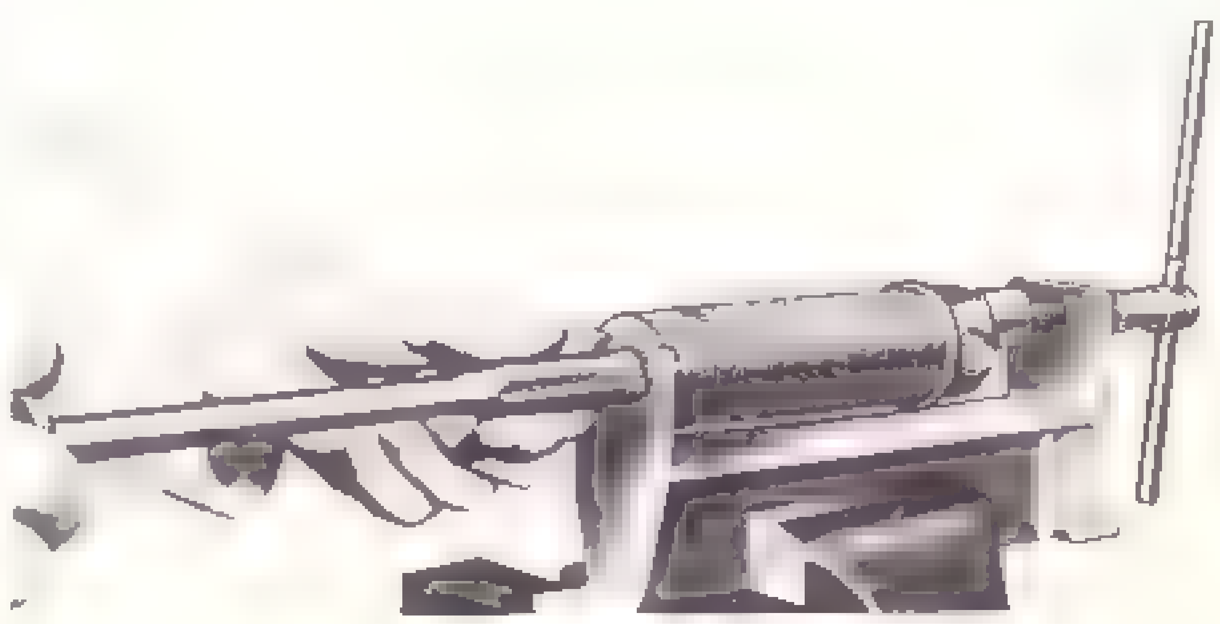


Figure 5—46. Installing screw and sleeve

Figure 5—47. Strainer elements disassembled

Separate strainer elements by sliding onto shank of screw and sleeve. (See figure 5—47.)

Note

Do not remove strainer elements from screw and sleeve.

5—119. *Cleaning.* The strainer elements may be cleaned, using either of the following two methods:

Note

Retain strainer elements on screw and sleeve as shown in figure 5—47, and mount assembly on a suitable cleaning rack. Separate strainer elements to permit circulation of cleaning solution around them.

a. Method I. (1) Immerse strainer elements in solvent (item 65, table 1—8), or equivalent for 15 to 20 minutes with air pressure agitation. Remove strainer elements from solvent and allow to drain.

(2) Immerse strainer elements in a solution of trichlorethylene (item 66, table 1—8) for 10 minutes. Remove strainer elements and allow to dry.

(3) Immerse strainer elements in solvent (item 67, table 1—8), or equivalent, for 15 minutes at 160°F (71°C). Remove strainer elements from solvent and allow to drain.

(4) Wash strainer elements with a high pressure steam jet followed by a thorough rinse in solvent (item 4, table 1—8).

Note

Insure that all strainer elements are clean. If any sludge remains, repeat cleaning procedure outlined in steps (1) through (4) above, scrubbing strainer elements with a stiff bristle brush if necessary.

(5) When strainer elements are thoroughly clean, coat with corrosion preventive, Type I (item 6, table 1—8).

b. Method II. (1) Immerse strainer elements in a bath of trichlorethylene (item 66, table 1—8) for 10 minutes. Remove strainer elements from bath and allow to drain completely.

(2) Immerse strainer elements in a bath of cleaner (item 68, table 1—8), or equivalent. Maintain cleaner at a temperature of 160°F (71°C). Agitate cleaner with air pressure for 1 hour, then remove strainer elements and allow to dry.

(3) Wash strainer assembly with a high pressure steam jet and allow to drain.

(4) Immerse strainer elements in preservative solution (item 69, table 1—8), or equivalent. Remove strainer elements from preservative solution and allow to drain.

5—120. *Inspection. a.* Inspect housing and body of oil strainer assembly for cracks, corrosion, dirt, foreign matter, and metallic particles.

b. Inspect strainer elements for cleanliness, holes, corrosion, distortion, and damage.

c. Inspect seat of relief valve for deformation, proper seating, and damage.

d. Check relief valve spring for cracks, corrosion, and proper spring tension.

Note

Spring tension should be 7.13 to 8.92 pounds at a height of 1.20 inches. If spring tension is less than 6.5 pounds, replacement of spring is required.

e. Inspect relief valve ball for pitting, dents, corrosion, and scratches.

f. Inspect all threads for damage.

5—121. *Reassembly. a.* Insert ball and spring of relief valve in opening in side of body. Position spring retaining disc over spring and compress spring until lock ring can be inserted in groove of body. Secure ball, spring, and spring retaining disc in place with lock ring.

Note

Insure that ball is seated firmly against its seat.

b. Slide strainer elements and retaining washer from screw and sleeve of fixture, part No. 809968, FSN 2810-474-3120, onto body of element assembly. Install element assembly in fixture.

Caution

To prevent possible damage to strainer elements or retaining washer, insure that strainer elements and retaining washer are properly aligned on body of element assembly.

c. Compress strainer elements and retaining washer by tightening square drive of fixture to a minimum torque of 20 inch-pounds. (See figure 5—48.)

Note

If retaining washer is compressed beyond lock ring groove before minimum torque valve is reached, add strainer elements to element assembly as necessary.

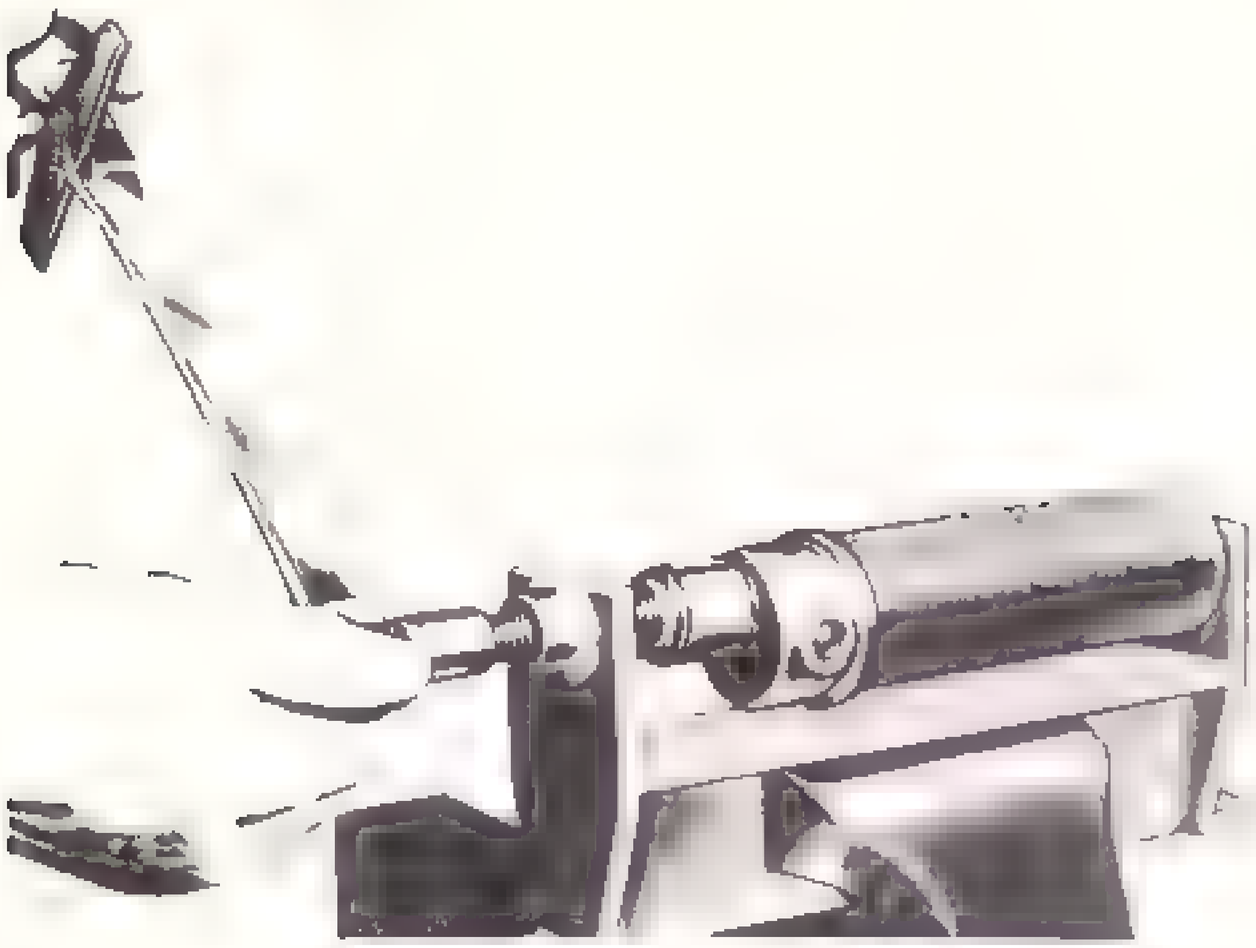


Figure 5—48. Compressing strainer elements

d. Remove screw and sleeve from retainer of element assembly.

e. Install lock ring on groove in retainer.

f. Release tension on strainer elements and remove element assembly from fixture.

g. Insert element assembly in its housing.

Note

Align hole in retaining washer with pin in housing.

h. Install cover on housing and secure loosely with puller screw, washer, and packing.

Note

Align hole in cover with pin in housing.

5—122. *Installation. a.* Position new packing in groove on inside of strainer cavity in supercharger rear cover.

Note

Lip of packing should face center of strainer cavity.

b. Position new gasket on oil strainer assembly mounting pad.

c. With puller screw loose in element assembly and in a floating condition in cover, push oil strainer assembly into strainer cavity.

Note

Rotate oil strainer assembly during installation to insure that it is slipping into strainer cavity without any force.

d. After oil strainer assembly is properly seated, secure to mounting studs with washers and nuts.

e. Tighten puller screw to a torque of 110 to 125 inch-pounds. Secure puller screw with lock wire to lug provided on cover.

5—123. Rear Oil Pump. The rear oil pump is mounted on the supercharger rear cover. The rear oil pump has a scavenge chamber vented to the supercharger rear cover with two scavenge gears and a pressure chamber with two pressure gears. The scavenge drive gear has a splined shaft on each end. The shaft is spring-loaded to hold the scavenge drive gear against the face of the wall between the pressure and scavenge chambers to prevent oil seepage from the pressure chamber through the scavenge chamber into the rear section when the engine is idle. One end of the shaft mates with the drive shaft at the supercharger rear cover, and the other end mates with the pressure drive gear. The scavenge gears pump oil from the rear section, through the outlet adapter, and back to the oil tank. The pressure gears pump oil from the oil tank to the engine. The rear oil pump has a pressure relief valve and a check valve installed in the housing of the rear oil pump.

5—124. *Removal. a.* Shut off oil supply from oil tanks and disconnect oil inlet and outlet lines from connections at rear oil pump.

Note

Place a suitable container under supercharger rear housing and rear oil pump, into which oil can drain.

b. Disconnect temperature bulb connections at bottom of rear oil pump housing.

c. Remove lock wire and remove screws and washers securing external scavenge oil line (5, figure 5—39) from rear flange of rear oil pump adapter. Use crowfoot attachment, part No. 804885, FSN 5120-033-0653. (See figure 5—49.)

d. Remove tachometer generator from tachometer drive housing on rear oil pump. (Refer to paragraph 10—59.)

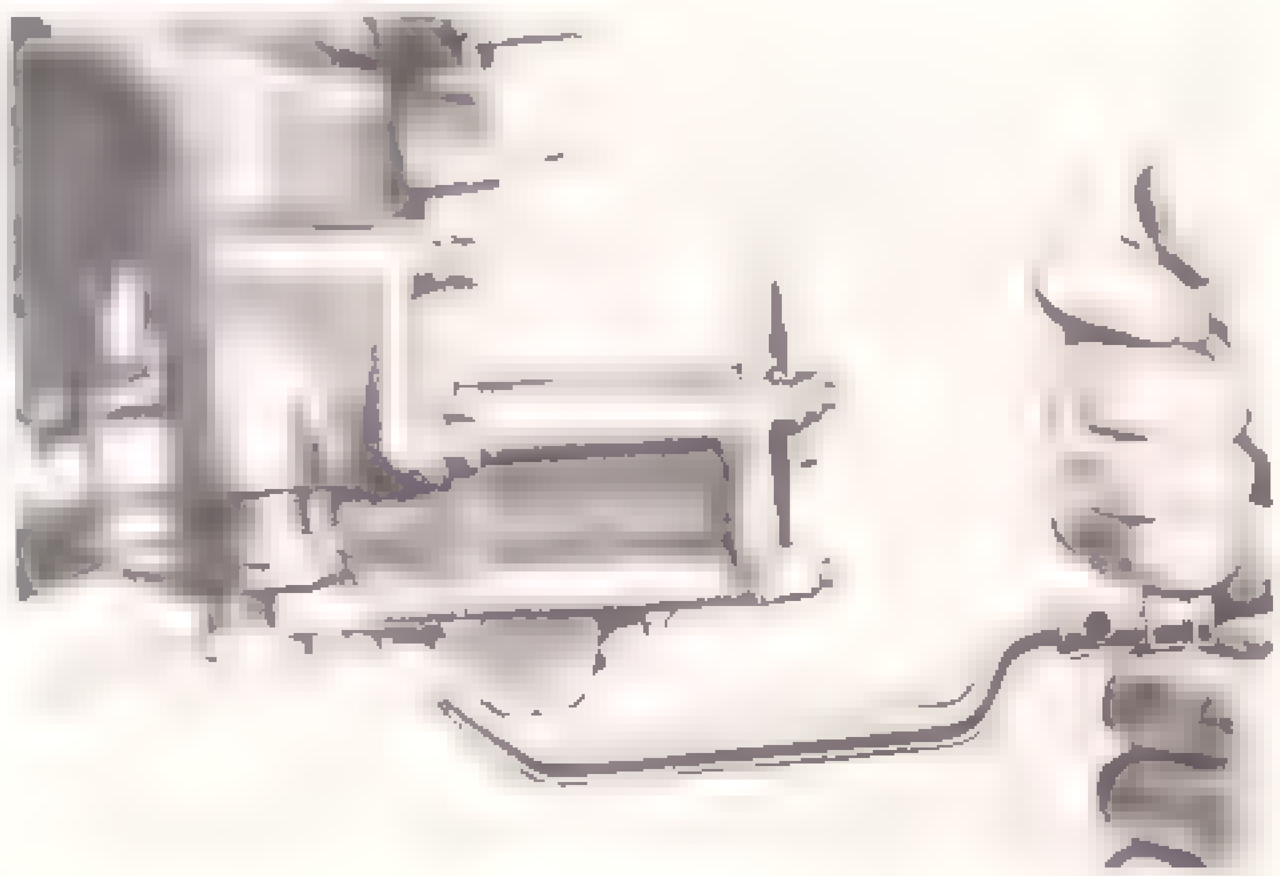


Figure 5—49. Removing screws securing external scavenge oil line

e. Remove nuts and washers securing tachometer drive housing on studs in rear oil pump. Remove tachometer drive housing and gasket. Discard gasket.

f. Remove nuts and washers securing rear oil pump on long studs in supercharger rear cover.

g. Remove lock wire and remove nut and washer securing foot of rear oil pump on studs in supercharger rear cover. Use crowfoot attachment, part No. 800684, FSN 5120-033-0541. (See figure 5–50.)

h. Pull rear oil pump away from supercharger rear cover and discard gasket. (See figure 5–51.)

i. Remove spring from drive gear of rear oil pump in supercharger rear cover.

5–125. Cleaning. Clean rear oil pump with solvent (item 4, table 1–8) and dry with filtered, compressed air.

5–126. Inspection. a. Inspect rear oil pump housing for cracks and dents.

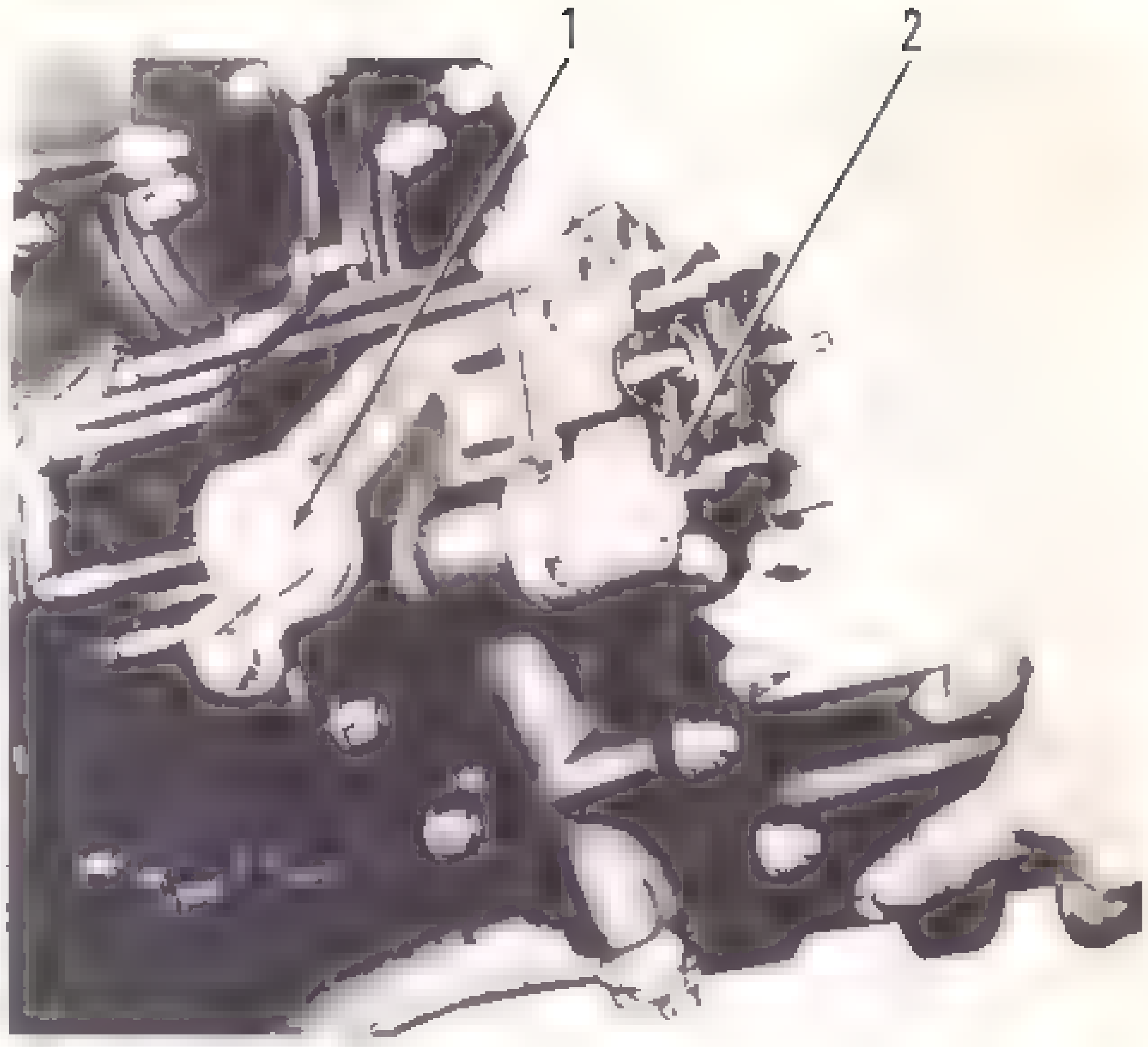
b. Inspect studs for malformed threads.

c. Check tension of spring, removed from drive gear in supercharger rear cover. The load at 1.78 inches should be 8 to 10 pounds. If spring tension is less than 7.3 pounds, replacement of spring is required.

5–127. Installation. a. Install spring on drive shaft, for rear oil pump, in supercharger rear cover.

b. Coat spline of drive shaft of rear oil pump with antiseize compound (item 54, table 1–8).

Figure 5–50. Removing nut at foot of rear oil pump



1. Check Valve
2. Oil Pressure Relief Valve

Figure 5–51. Removing rear oil pump

c. Position new gasket and rear oil pump on studs in supercharger rear cover. Secure with washers and nuts. Tighten nuts to a torque of 85 to 100 inch-pounds.

d. Install washer and nut on stud at foot of rear oil pump. Tighten nut to a torque of 85 to 100 inch-pounds and secure with lock wire.

e. Position new gasket and tachometer drive housing on studs in rear oil pump, and secure with washers and nuts.

f. Install tachometer generator.

g. Connect temperature bulb connections at bottom of rear oil pump housing.

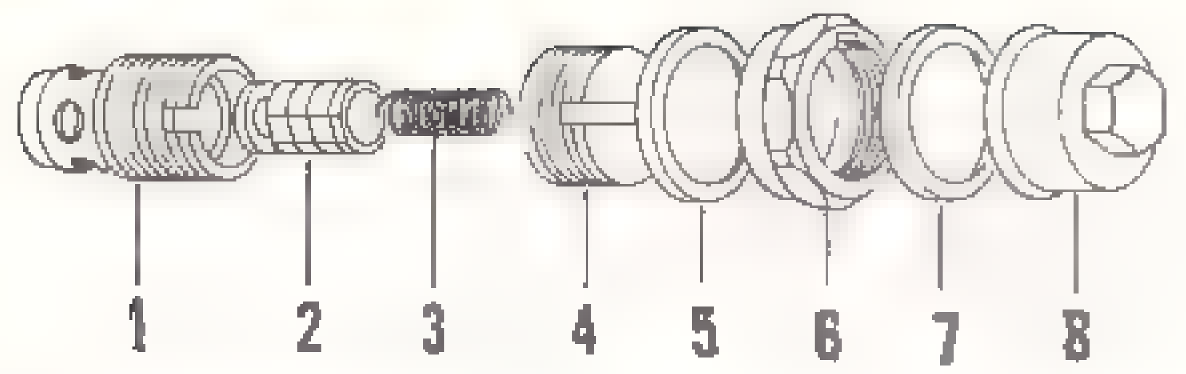
h. Position external scavenge oil line (5, figure 5–39) on rear flange of rear oil pump adapter, and secure with washers and screws. Secure screws with lock wire. Use crowfoot attachment, part No. 804855, FSN 5120-033-0653.

i. Connect oil inlet and outlet lines to inlet and outlet ports of rear oil pump. Turn on oil supply from oil tanks.

j. Preoil engine in accordance with paragraph 5–7.

k. Adjust pressure relief valve in accordance with paragraph 5–128*e*.

5–128. Oil Pressure Relief Valve. The oil pressure relief valve (figure 5–52) is installed in the rear oil pump housing. The oil pressure relief valve provides a means of adjusting the engine oil pressure to within specified



1. Relief Valve Body
2. Relief Valve
3. Spring
4. Adjusting Screw
5. Washer
6. Nut
7. Cap Washer
8. Cap

Figure 5–52. Oil pressure relief valve installation

limits during normal engine operation. Normally, pressurized oil bypasses the oil pressure relief valve through the check valve and into the oil strainer cavity in the supercharger rear cover. In case of excessive oil pressure, some oil passes through the oil pressure relief valve back to the inlet side of the pressure chamber of the rear oil pump. At high engine rpm, the speed of the rear oil pump and oil pressure will increase, and when oil pressure rises above a predetermined point. oil pressure on one side of the pressure relief valve counterbalances spring tension on the other.

a. Removal. (1) Remove lock wire and remove cap (8, figure 5–52), cap washer (7), nut (6), and washer (5).

(2) Carefully back off spring-loaded adjusting screw (4) with a screwdriver and remove adjusting nut.

(3) Remove spring (3) and relief valve (2) from relief valve body (1) in rear oil pump housing.

b. Cleaning. (1) Clean oil pressure relief valve with solvent (item 4, table 1–8) and dry with filtered compressed air.

(2) Polish outside surface of relief valve and inside surface of relief valve body with cloth (item 23, table 1–8) and lubricating oil (item 61, table 1–8).

(3) Thoroughly remove all particles of cloth and lubricating oil with solvent (item 4, table 1–8) and a clean, soft cloth.

c. Inspection. (1) Inspect cap, nut, and adjusting screw for nicks, burrs, and malformed threads.

(2) Inspect relief valve for nicks, burrs, and cracks.

(3) Check tension of spring. The load at 1.38 inches should be 6 to 8 pounds. If spring tension is less than 5.6 pounds, replacement of spring is required.

d. Installation. (1) Dip all components of pressure relief valve in lubricating oil (item 61, table 1–8).

(2) Insert relief valve (2, figure 5–52) into relief valve body (1), and spring (3) into relief valve.

(3) Screw adjusting screw (4) all the way into relief valve body (1), then back off two and one-half turns.

(4) Install washer (5) and nut (6). Tighten nut to a torque of 125 to 150 inch-pounds.

(5) Install cap washer (7) and cap (8). Tighten cap to a torque of 75 to 100 inch-pounds.

(6) Adjust oil pressure in accordance with paragraph *e* below.

e. Adjustment. (1) Start engine in accordance with TM 55-1520-202-10.

Warning

Engine operation will be performed by authorized personnel only.

(2) Operate engine at a speed of 1800 rpm with an oil inlet temperature at 185°F (85°C), and check engine oil pressure.

(3) If oil pressure does not fall within limits of 75 ± 5 psi, adjust oil pressure relief valve as follows:

(a) Remove cap (8, figure 5–52) and cap washer (7).

(b) Loosen nut (6) with socket, part No. 801999, FSN 5120-144-5049.

(c) Hold nut (6) with wrench and turn adjusting screw (4) with a screwdriver, to raise or lower oil pressure as required.

Note

One turn of adjusting screw (4) changes oil pressure approximately 8 to 10 psi. Loosening adjusting screw reduces oil pressure; tightening adjusting screw increases oil pressure.

(d) After correct oil pressure is obtained, tighten nut (6) to a torque of 125 to 150 inch-pounds.

(e) Install cap washer (7) and cap (8). Tighten cap to a torque of 75 to 100 inch-pounds. Secure cap with lock wire.

5–129. Check Valve. The check valve (1, figure 5–51) is installed in the housing of the rear oil pump. The check valve is a cone-type valve, vented from the rear to prevent liquid lock.

a. Removal. (1) Remove lock wire and remove valve retainer from rear oil pump housing. Hold valve retainer firmly so that loading from spring will not cause it to snap out as last thread is disengaged, if spring has not been previously removed. (See figure 5–53.)

(2) Remove gasket from valve retainer and discard gasket.

(3) Remove spring, if installed, from valve, and carefully slip valve from valve body. Discard spring.

(4) Remove ring from valve and discard ring.

b. Cleaning. (1) Clean all components of check valve with solvent (item 4, table 1–8).

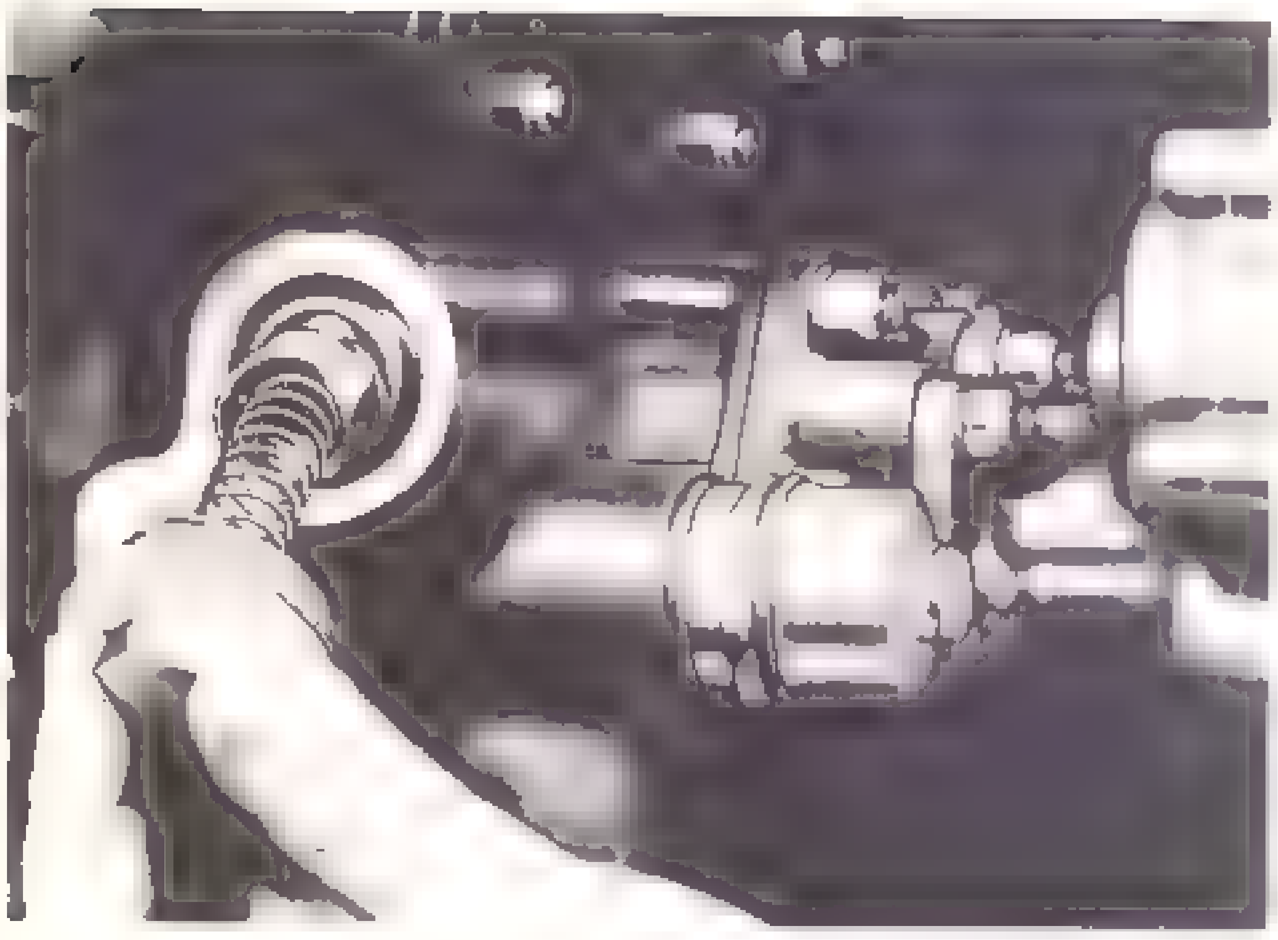


Figure 5–53. Removing valve retainer with spring

(2) Polish outside surface of valve and inside surface of valve body with cloth (item 23, table 1–8) and lubricating oil (item 61, table 1–8).

(3) Thoroughly remove all particles of cloth and lubricating oil with solvent (item 4, table 1–8) and a clean, soft cloth.

c. Inspection. Inspect valve and valve retainer for cracks, dents, and burrs; valve retainer for malformed threads.

d. Installation. (1) Install new ring into groove of valve. Do not peel ring into position.

(2) Swab valve with a liberal amount of lubricating oil (item 61, table 1–8).

(3) Position valve into valve body with its closed end toward inside of rear oil pump. Insure that vent hole behind valve is open. (See figure 5–54.)

Caution

Do not reinstall spring into valve.

(4) Position new gasket on valve retainer and install valve retainer. Tighten valve retainer and secure with lock wire to plug just forward and below valve retainer.

5–130. Front Oil Pump. The front oil pump is located in the lower end of the front oil sump. A check valve is installed internally in the front oil pump. The front oil pump pumps oil that has collected in the front oil sump back to the oil tanks.

5–131. Removal. a. Remove rocker box drain sump. (Refer to paragraph 5–13.)

b. Remove nuts and washers securing front oil pump in front oil sump.

c. Install two suitable puller bolts in holes located in flange of front oil pump. Screw puller bolts evenly until front oil pump is withdrawn from front oil sump. (See figure 5–55.)

Caution

Do not allow front oil pump or drive shaft to drop.

d. Remove drive shaft from front oil pump or front oil sump, as applicable.

5–132. Cleaning. a. Clean front oil pump by flushing with solvent (item 4, table 1–8); dry with filtered, compressed air.

b. After front oil pump is thoroughly dry, dip in lubricating oil (item 61, table 1–8).

5–133. Inspection. Inspect front oil pump for cracks, dents, burrs, thread damage, and corrosion.

5–134. Installation. a. Apply lubricating oil (item 61, table 1–8) on ends of drive shaft, and engage cap end with splined end of drive gear of front oil pump.

b. Position front oil pump into front oil sump, and mesh splines of drive shaft with drive shaft gear in crankcase front section.

Figure 5–54. Vent hole location behind valve

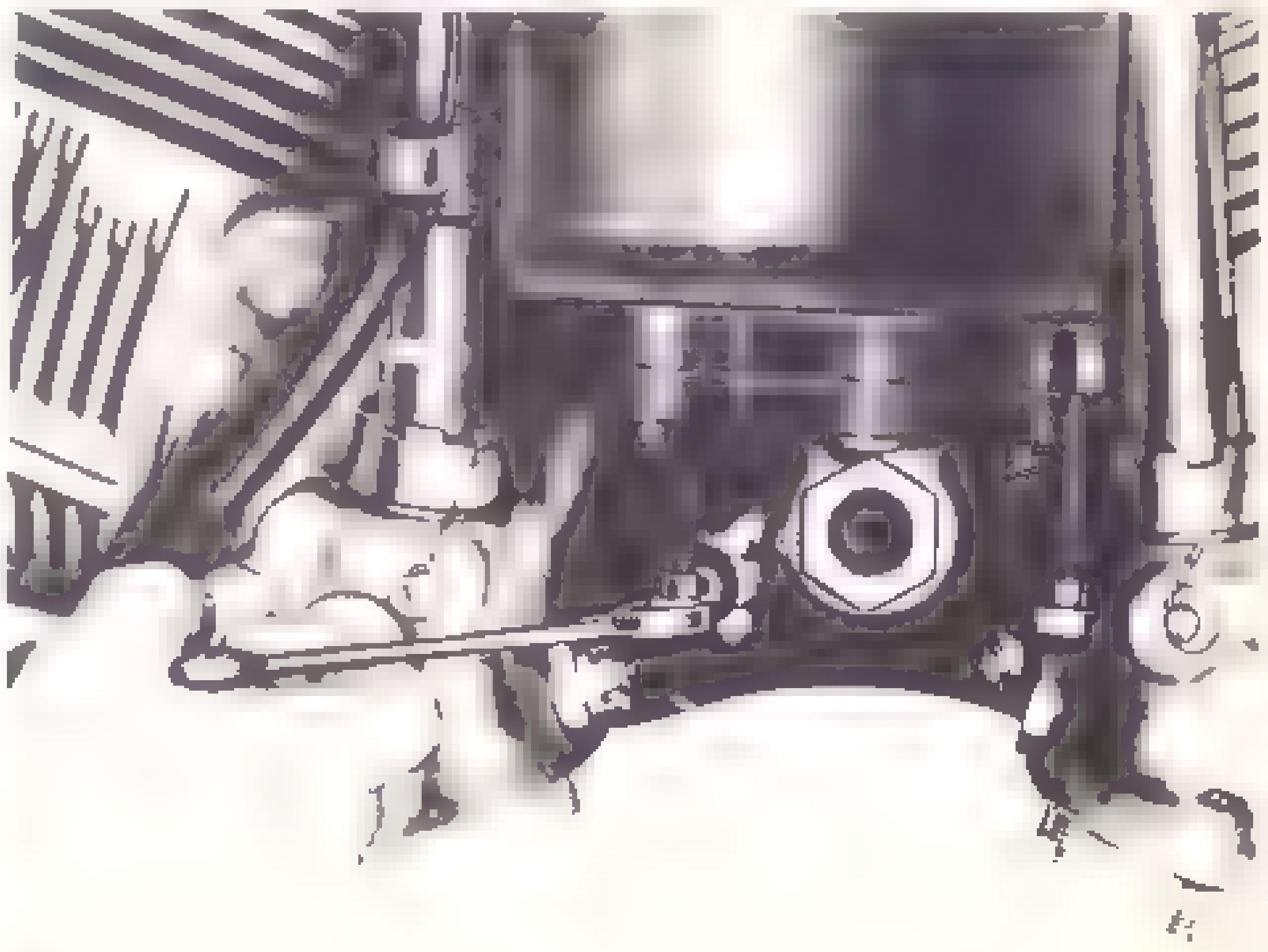


Figure 5–55. Pulling front oil pumps from front oil sumps

c. Push front oil pump until flange is seated on lower end of front oil sump, and secure with washers and nuts.

d. Install rocker box drain sump. (Refer to paragraph 5–16.)

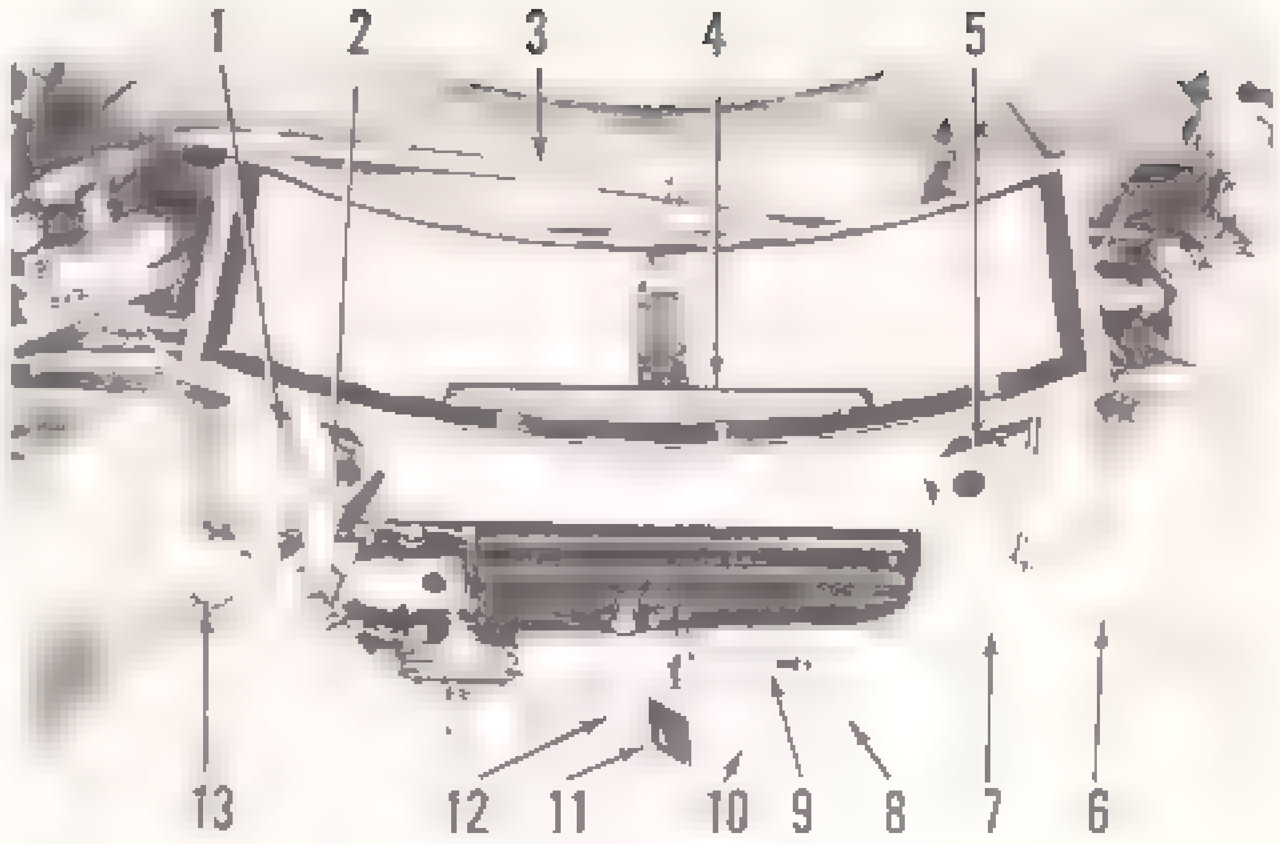
5–135. Oil Cooler Assembly. The engine oil cooler assembly is suspended in the engine compartment in the space between the two forward sections of the fuselage bottom structure. Cooling ram air from the engine cooling system is supplied to the oil cooler assembly through a metal duct assembly attached to the lower engine cowling panel. Oil from the engine flows to the oil cooler through a flexible hose assembly; oil from the oil cooler assembly returns to the oil cells through a metal tube which interconnects the two oil cells. The oil cooler assembly is automatic in operation. When the engine is started and while oil is cold, the core of the oil cooler assembly is bypassed. As the oil begins to warm up, a thermostatically controlled valve allows a portion of the oil to pass through the core. As the oil temperature increases, the amount of oil passing through the core increases until, finally, all oil passes through the core. The temperature of the oil is then maintained at proper operating level by thermostatically controlled shutters below the core which regulates the flow of air through the core. (See figure 5–56.)

5–136. Inspection. a. Inspect oil cooler assembly for damaged or clogged core, corrosion, cracks, security of mounting, and indications of leakage.

b. Inspect oil lines and fittings connected to oil cooler assembly for leaks, cracks, distortion, and security of attachment.

c. Inspect cooling air duct assembly for cracks, corrosion, distortion, and security of attachment.

5–137. Oil Cells (Oil Tanks). A bladder-type oil cell is installed in each side of the fuselage bottom structure in the engine compartment. The two oil cells are interconnected by oil cell inlet and oil cell return tubes. A drain fitting and drain valve are installed in the bottom of each oil cell. An access hole in the top of each oil cell is covered by a stainless steel cover. The engine vent line is attached to a fitting in each of these covers. Both oil cells are filled through a single oil filler which is located on the right side of the helicopter, just below the screened engine fan air intake opening. The oil level dipstick is attached to the oil filler cap, which is secured by a chain to the neck of the oil filler. The oil filler projects into the right oil cell through the oil cell cover and access hole. On helicopters serial No. prior to 56-4313, the clutch oil pump is mounted on the cover over the left oil cell. On helicopters serial No. 56-4313 and subsequent, the clutch inverter valve is located above the cover of the right oil cell. (See figures 5–57 and 5–58.)



1. Bracket
2. Oil Return Tube
3. Vent Tube
4. Oil Cooler (Oil Temperature Regulator)
5. Bracket
6. Outlet Tube Connector
7. Outlet Tube
8. Drain Valve
9. Y-Fitting
10. Swing Check
11. Housing
12. Manual Shutoff Valve
13. Outlet Tube Connector

Figure 5–56. Oil cooler installation

5–138. Servicing. Fill oil cells (oil tanks). (Refer to table 1–5.)

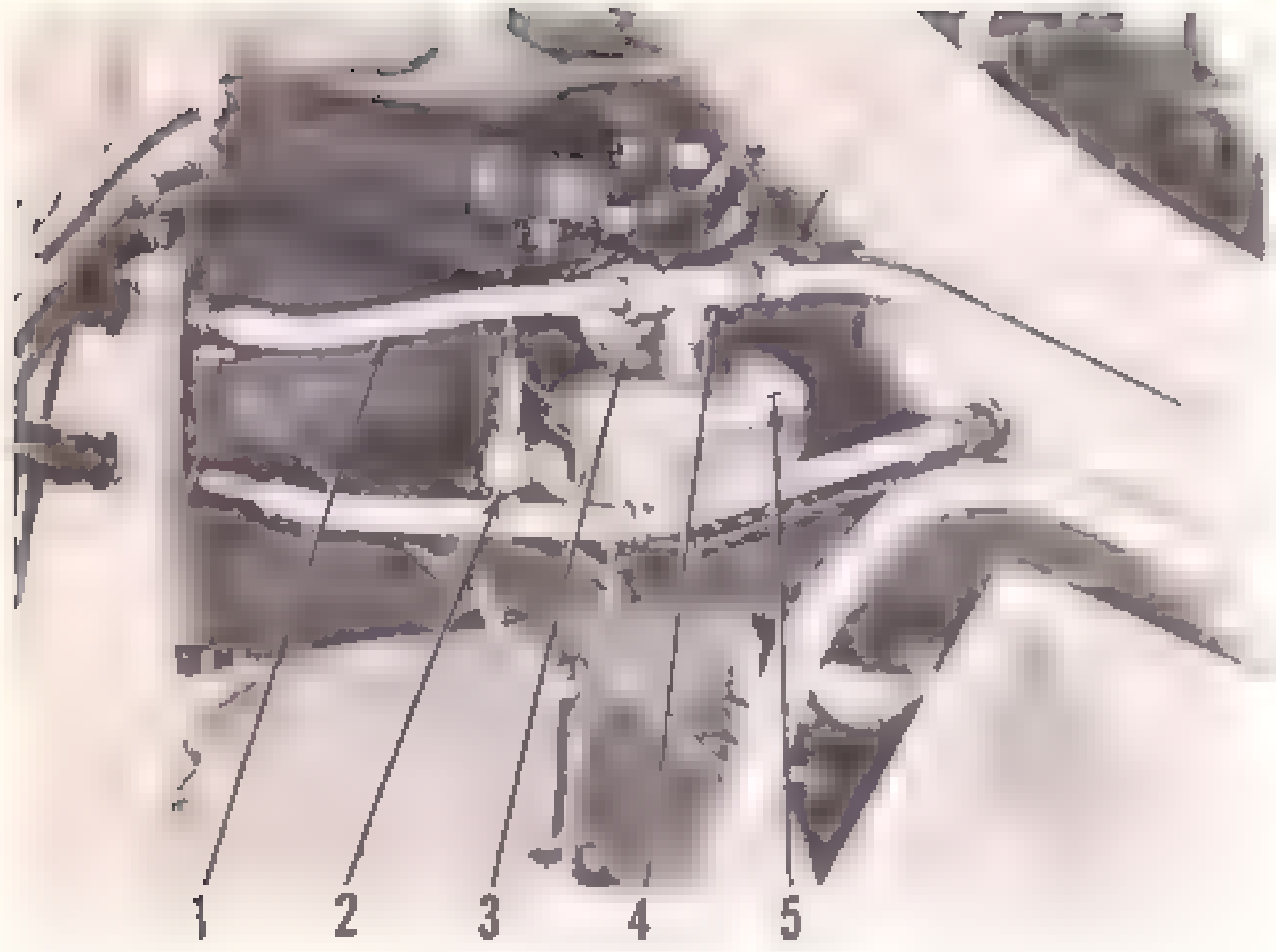
5–139. Inspection. a. Inspect oil filler for damage, security of attachment, and indications of leakage. Check filler cap for proper security.

b. Inspect bottom of fuselage under each oil cell for indications of leakage.

c. Inspect all oil lines connected to right and left oil cells for leaks, cracks, distortion, and security of attachment.

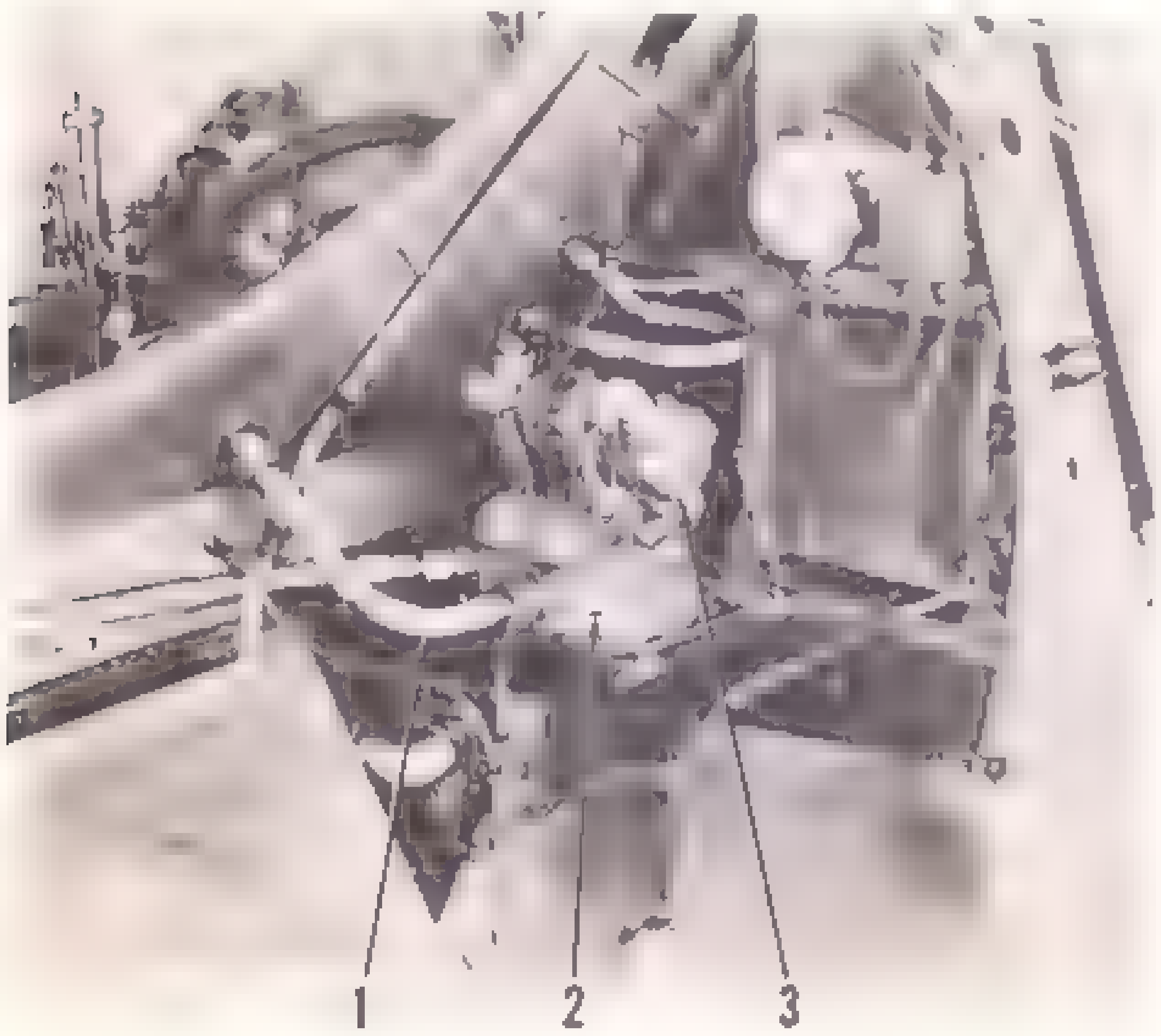
d. Inspect drain valves for security of attachment and indications of leakage.

5–140. Oil Dilution System. The oil dilution system consists of an oil dilution fuel supply line, oil dilution solenoid valve, oil dilution line, and manual shutoff valve. The oil dilution system supplies fuel to the Y-fitting in the engine oil inlet line. The flow of fuel is controlled by an oil dilution switch, marked OIL DIL–OFF or OIL DIL–OFF–ENG PRM, on the main switch panel in the pilots' compartment. The oil dilution fuel supply line is connected to the restrictor tee in the fuel pressure gage line, located on the



1. Vent Tube
2. Oil Dilution Solenoid Valve
3. Coupling
4. Tee
5. Right Cell Cover

Figure 5–57. Right oil cell (helicopters serial No. prior to 56-4313)



1. Clutch Oil Return Tube
2. Left Cell Cover
3. Clutch Oil Pump

Figure 5–58. Left oil cell (helicopters serial No. prior to 56-4313)

forward surface of the canted bulkhead, and the oil dilution solenoid valve. The oil dilution solenoid valve is installed in a bracket above the right oil cell. The oil dilution line is connected to the oil dilution solenoid valve and the manual shutoff valve and is held in place with clamps. The manual shutoff valve is installed in the Y-fitting and is used to activate or deactivate the oil dilution system.

Note

The manual shutoff valve should be open only when operating in climatic conditions requiring oil dilution.

5–141. Removal. a. Place BATT and GEN switches in OFF position. Disconnect external power source from external power receptacle.

b. Place fuel selector valve in OFF position.

c. Place manual shutoff valve (12, figure 5–56) in CLOSED position.

d. Disconnect oil dilution line from manual shutoff valve (12) and oil dilution solenoid valve (2, figure 5–57).

e. Remove clamps securing oil dilution line. Remove oil dilution line.

f. Disconnect oil dilution fuel supply line from oil dilution solenoid valve (2) and at restrictor tee in fuel pressure line on forward surface of canted bulkhead. Remove oil dilution fuel supply line and install cap on restrictor tee to prevent spillage of fuel.

g. Disconnect electrical plug from oil dilution solenoid valve.

h. Remove screws and washers securing clamps and oil dilution solenoid valve to mounting bracket. Remove clamps and oil dilution solenoid valve. Remove elbow, nipple, and reducers from oil dilution solenoid valve.

i. Remove bolts and washers, and remove mounting bracket (oil dilution solenoid valve) from right oil cell cover. Reinstall bolts and washers.

j. Remove manual shutoff valve (12, figure 5–56) and gasket from Y-fitting. Install plug in Y-fitting to prevent spillage of oil.

5–142. Cleaning. a. Clean oil dilution fuel supply line, oil dilution line, and manual shutoff valve with solvent (item 4, table 1–8). Dry thoroughly with filtered, compressed air.

b. Clean external surfaces of oil dilution solenoid valve with a cloth moistened with solvent (item 4, table 1–8). Flush valve components only with solvent.

Caution

Do not allow oil dilution solenoid valve to soak in solvent.

5–143. Inspection. a. Inspect oil dilution fuel supply line and oil dilution line for cracks, corrosion, distortion, damaged threads, and chafing.

b. Inspect manual shutoff valve for damaged threads, proper operation, corrosion, cracks, and loose or damaged components.

c. Inspect oil dilution solenoid valve for loose or bent contact pins, damaged threads, corrosion, cracks, and loose or damaged components.

d. Inspect mounting bracket for cracks, distortion, and damage.

5–144. Installation. a. Remove forward center bolt from right cell cover (5, figure 5–57), and remove bolt to left of forward center bolt hole. Position mounting bracket (oil dilution solenoid valve) over bolt holes and install bolts and washers. Secure bolts with lock wire.

b. Install reducer in each port of oil dilution solenoid valve (2). Install elbow in inlet port reducer, and nipple in outlet port reducer.

Note

Open end of elbow should face upward.

c. Position clamps and oil dilution solenoid valve (2) on mounting bracket. Secure clamps with screws and washers. Secure screws with lock wire.

d. Connect electrical plug to oil dilution solenoid valve (2). Secure electrical plug with lock wire.

Warning

Insure that all electrical power is turned OFF prior to connecting electrical plug.

e. Remove cap from restrictor tee in fuel pressure gage line on forward surface of canted bulkhead. Connect oil dilution fuel supply line to restrictor tee and oil dilution solenoid valve (2).

f. Position new gasket on manual shutoff valve (12, figure 5–56). Install manual shutoff valve in Y-fitting (9).

g. Connect oil dilution line to manual shutoff valve (12) and oil dilution solenoid valve (2, figure 5–57). Secure oil dilution line in place with clamps.

h. Preoil engine as outlined in paragraph 5–7.

i. Pressure-check oil dilution system for leakage.

5–145. Periodic Oil Dilution. The purpose of periodic oil dilution is to retard formation of hard sludge deposits in the engine. However, periodic oil dilution procedures shall be initiated only on engines with less than 130 hours of operating time since new or overhauled. The periodic oil dilution may be accomplished by utilizing either of the following procedures:

Caution

The use of periodic oil dilution will be at the discretion of the maintenance officer. If it is determined that periodic oil dilution will be accomplished, follow procedure A or B outlined below.

a. Procedure A. This procedure will be accomplished at 50-hour intervals as follows:

(1) Start engine in accordance with TM 55-1520-202-10.

Warning

Engine operation will be performed by authorized personnel only.

(2) Operate engine at 1000 to 1200 rpm and dilute oil 10 percent (approximately 1 minute).

Note

Complete operation shall be for a minimum of 10 minutes with oil temperature not in excess of 122°F (50°C).

(3) Shut down engine in accordance with TM 55-1520-202-10.

(4) Upon shutdown of engine at completion of above operation, remove, inspect, and clean magnetic chip detector plugs, oil sump strainers, and oil strainer assembly.

(5) If, during above inspection, excessive deposits are noted, run engine an additional 10 minutes, and repeat step (4) above. Repeat this procedure until strainer is substantially free of deposits.

(6) Drain and service oil tanks. (Refer to tables 1–5 and 1–6.)

b. Procedure B (alternate procedure). The following procedure shall be accomplished prior to each flight or while taxiing as follows:

(1) Start engine in accordance with TM 55-1520-202-10.

Warning

Engine operation will be performed by authorized personnel only.

(2) Operate engine at 1000 to 1200 rpm and dilute oil 10 percent (approximately 1 minute).

Note

This procedure will not be accomplished in cold weather operation when oil was diluted prior to engine shutdown.

(3) Upon completion of oil dilution specified in step (2) above, and prior to takeoff or high power operation, operate engine a minimum of 10 minutes at an oil temperature above 122°F (50°C).

Note

During cold weather operation, when oil dilution is not effected on a daily basis, remove, inspect, and clean magnetic chip detector plugs, oil sump strainers, and oil strainer assembly.

Section VII Ignition System

5–146. Description. The ignition system (figure 5–59) consists of a starter system, ignition harness assembly, ignition switch, magneto, induction vibrator, synchronizing breaker, and spark plugs.

5–147. Starter System. The starter system consists of a starter, starter relay, and starter switch. The starter is installed on the accessory section of the engine and is driven by dc power from the primary bus located in the power relay junction box (helicopters serial No. prior to 56-4313) or battery box (helicopters serial No. 56-4313 and subsequent). This circuit is controlled by a starter relay operated by dc power from a primary bus located in the overhead fuse and circuit breaker panel. The starter relay is closed by pressing the starter switch button on the pilot's collective pitch control. A throttle limit switch, located on the right wall near the front cabin, breaks the starter relay energizing circuit, preventing the starter from being energized unless the pilot's collective pitch control is in low pitch position and the throttle is closed. (See figure 5–60.)

Note

The starter relay energizing circuit is protected by a circuit breaker in the overhead fuse and circuit breaker panel. Refer to paragraph 12–38 for maintenance instructions on the circuit breaker.

5–148. Troubleshooting. For troubleshooting procedures for the starter system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Starter turns engine sluggishly or fails completely	Worn, dirty, or sticky brushes	Replace starter. (Refer to paragraphs 5–149*a* or *b* and *d* or *e*.)
	Broken brush springs	Replace starter. (Refer to paragraphs 5–149*a* or *b* and *d* or *e*.)
	Pitted, dirty, or worn commutator	Replace starter. (Refer to paragraphs 5–149*a* or *b* and *d* or *e*.)
	Weak or discharged battery	Replace battery; use external power for starting. (Refer to paragraphs 12–69 and 12–73.)
	Poor electrical connections	Clean and tighten connections.
	Starter switch defective	Replace starter switch. (Refer to paragraphs 5–151*a* and *c*.)
	Starter relay defective	Replace starter relay. (Refer to paragraphs 5–150*a* and *c*.)
Starter relay clicks on and off	Weak or discharged battery	Replace battery; use external power for starting. (Refer to paragraphs 12–69 and 12–73.)
	Starter relay defective	Replace starter relay. (Refer to paragraphs 5–150*a* and *c*.)

5–149. Starter. The 28-volt, direct-cranking type starter (11, figure 5–61) is mounted on the accessory section of the engine and is actuated by the starter switch located on the pilot's collective pitch control lever. When the starter switch is depressed, the starter jaw engages the engine starter jaw coupling and cranks the engine. When the engine starts, the engine starter jaw coupling overrides the starter jaw and disengagement is automatic.

a. Removal (without terminal cap). (1) Place BATT and IGNITION switches in OFF position. Disconnect battery leads from battery terminals.

(2) Remove clamps (19, figure 5–62) securing fuel pump hose assembly (18) to starter.

(3) Remove bracket (20) securing synchronizing breaker and tachometer generator conduit to starter.

(4) Remove bracket (15) which secures carburetor air temperature bulb conduit to base of starter.

(5) Carefully fold back nipple (16) covering connecting point of terminal post and starter cable terminal.

(6) Remove cotter pin, castellated nut, lockwasher, and flat washer from terminal post (10, figure 5–61)

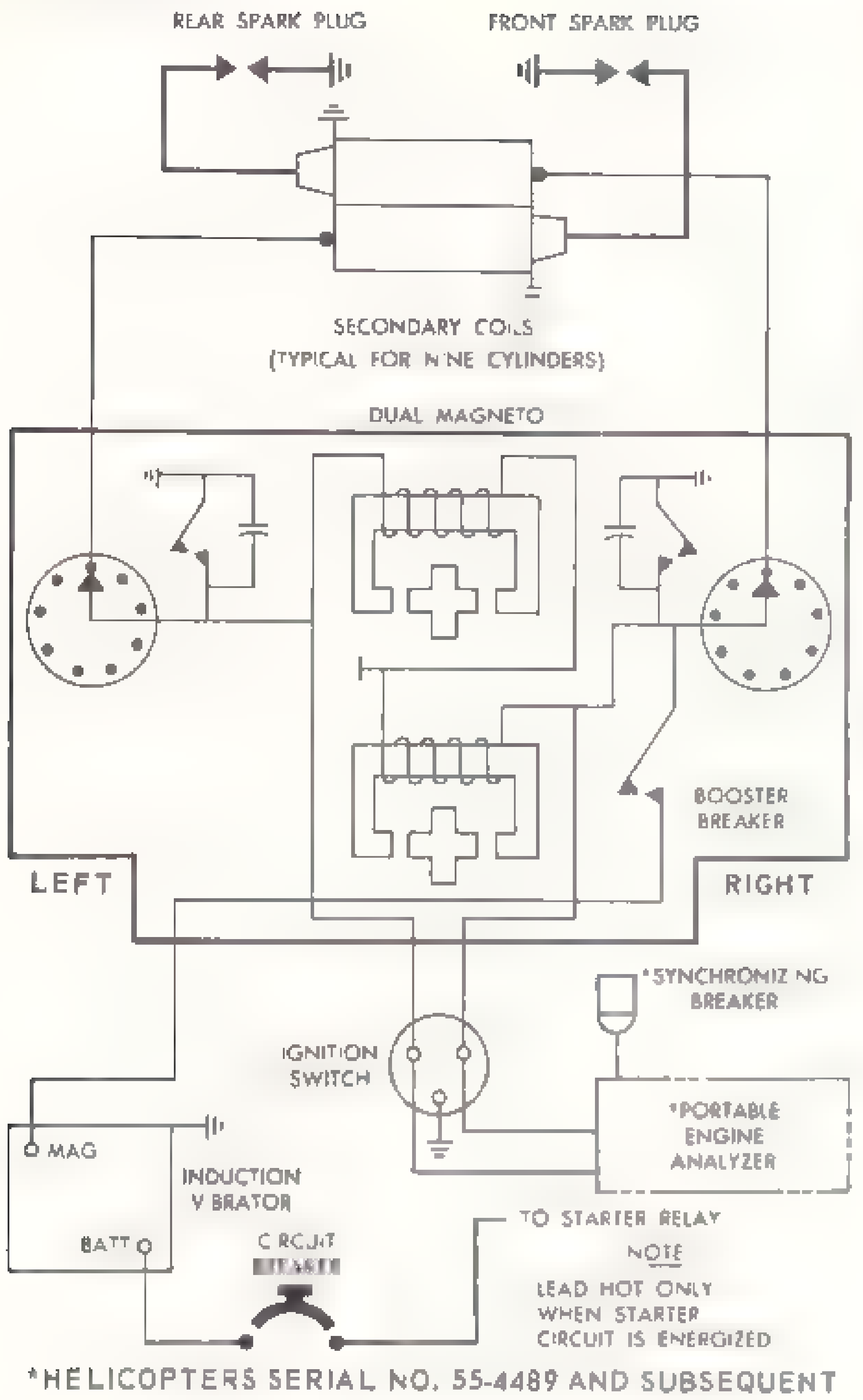


Figure 5–59. Ignition system schematic diagram

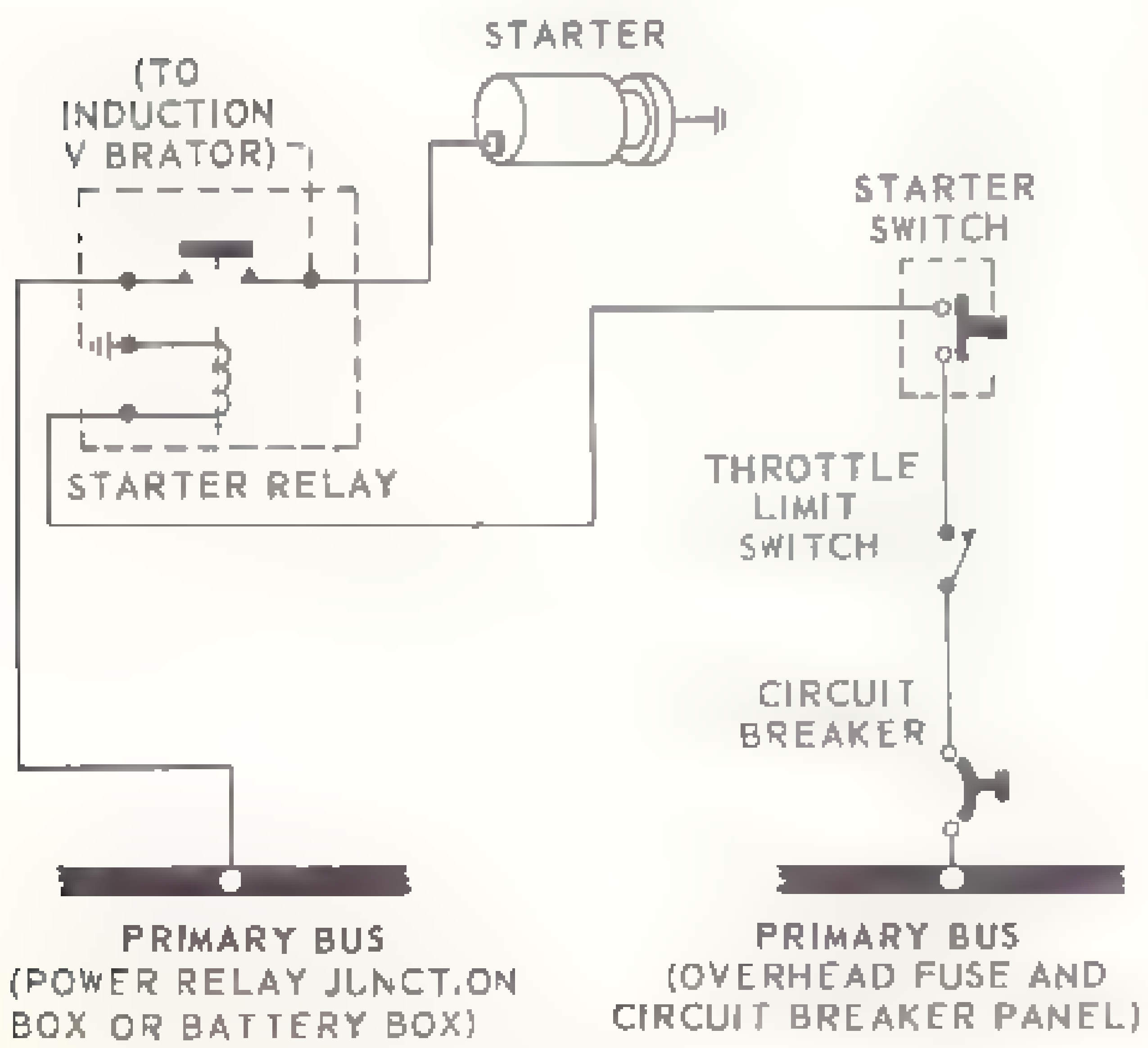
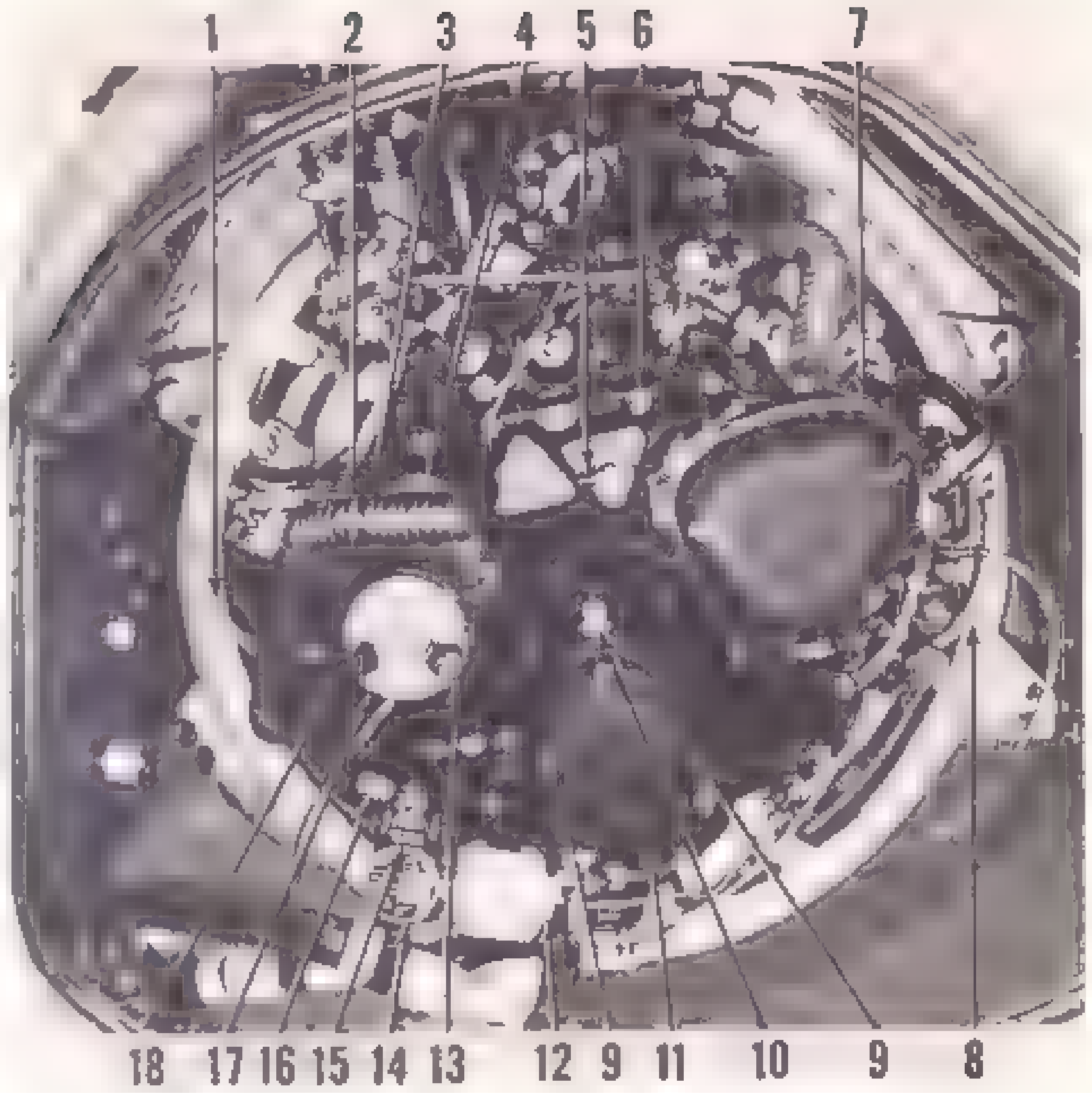


Figure 5–60. Starter system schematic diagram



1. Bonding Jumper
2. Clamp
3. Flexible Tube
4. Elbow
5. Restrictor
6. Restrictor
7. Magneto
8. Bonding Jumper
9. Screw
10. Terminal Post
11. Starter
12. Synchronizing Breaker
13. Reducer
14. Tachometer Generator
15. Electrical Receptacle
16. Bracket
17. Hydraulic Pump
18. Reducer

Figure 5–61. Engine accessories

of starter. Remove starter cable terminal from terminal post.

(7) Remove nuts and washers securing starter (11) to accessory mounting pad. Remove starter and gasket. Discard gasket.

b. Removal (with terminal cap). (1) Accomplish procedures as outlined in paragraph *a*, steps (1) through (4) above.

(2) Remove large knurled nut, washer, and split gasket from starter terminal cap (10, figure 5–63). Remove screws securing top half of terminal cap. Remove top half of terminal cap.

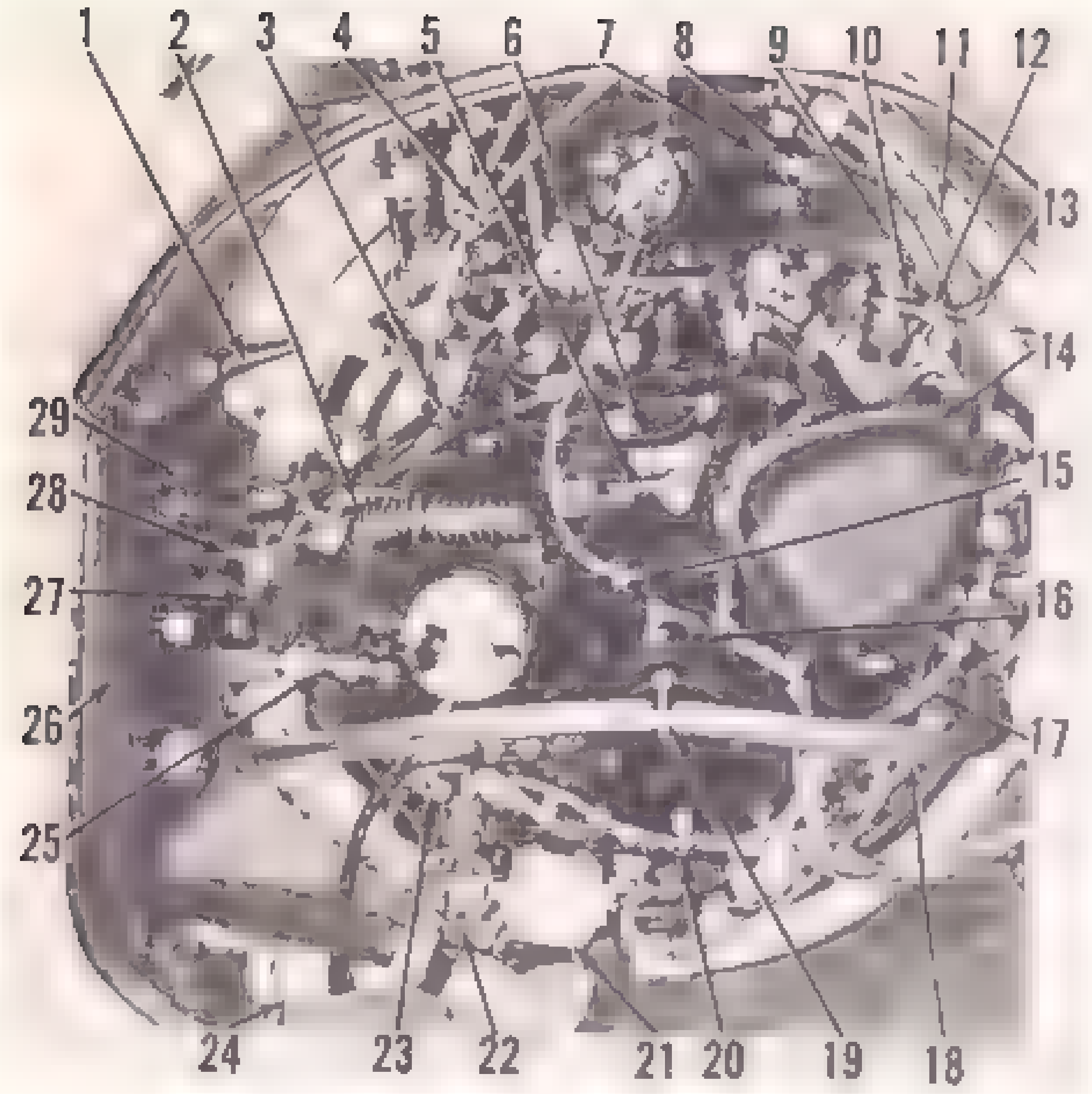
(3) Accomplish procedures outlined in paragraph *a*, step (6) above.

(4) Slide starter cable terminal from large knurled nut and washer.

(5) Accomplish procedures outlined in paragraph *a*, step (7) above.

c. Inspection. (1) Inspect terminal post for stripped or damaged threads, and security of mounting.

(2) Inspect starter housing for indications of overheating, corrosion, and cracks (especially at mounting flange).

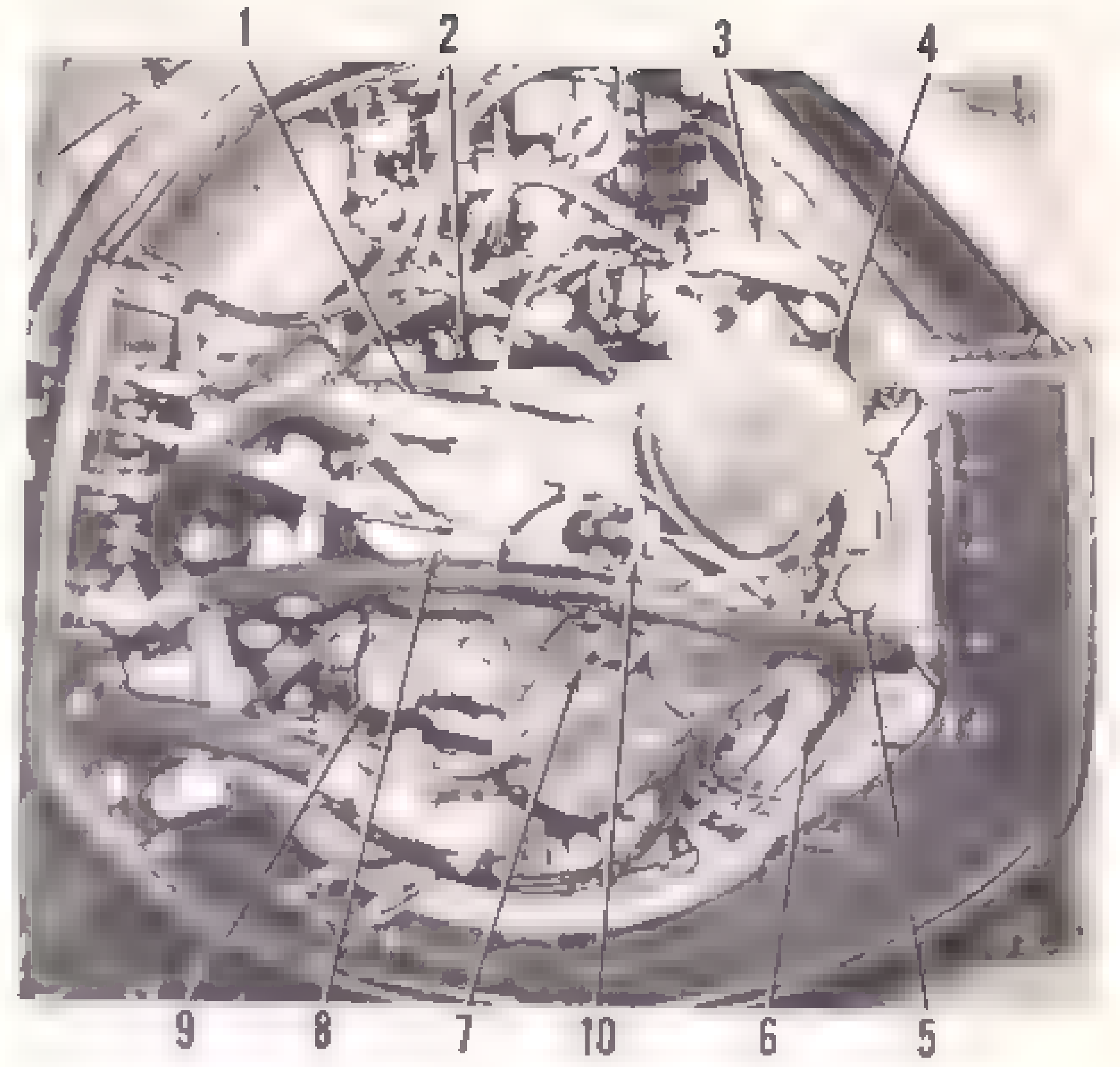


1. Hose Assembly
2. Hose Assembly
3. Clamp
4. Hose Assembly
5. Hose Assembly
6. Hose Assembly
7. Clamp
8. Clamp
9. Flexible Tube
10. Clamp
11. Carburetor Inlet Hose
12. Screw, Washer, Nut
13. Clamp
14. Magneto
15. Bracket
16. Nipple
17. Conduit Assembly
18. Hose Assembly
19. Clamp
20. Bracket
21. Synchronizing Breaker
22. Tachometer Generator
23. Bracket
24. Oil Inlet Hose Assembly
25. Hose Assembly
26. Left Shroud Panel
27. Hose Assembly
28. Hose Assembly
29. Tee

Figure 5–62. Hoses and wiring locations

(3) Inspect commutator for pitting, indications of wear, evidence of arcing, and presence of oil or metal particles.

(4) Inspect starter brushes for excessive wear (1/2-inch overall length or to mark) and freedom of movement in brush holder.



1. Flexible Magneto Cooling Tube
2. Carburetor
3. Flexible Magneto Cooling Tube
4. Dual Magneto Distributor
5. Engine-Driven Fuel Pump
6. Engine Mount Cooling Tube
7. Starter
8. Hydraulic Pump (Auxiliary Hydraulic System)
9. Tachometer Generator
10. Terminal Cap

Figure 5–63. Engine accessory section

(5) Inspect brush heads for deterioration, chafing, or loose connections.

(6) Inspect starter drive shaft for freedom of rotation. Check starter drive shaft for side play.

(7) Inspect brush springs for cracks, breaks, and indications of overheating.

d. Installation (without terminal cap). (1) Insure that surfaces of mounting pad (starter) on engine and mounting flange of starter are clean, dry, and free of dents, marks, or abrasions.

(2) Lightly coat internal splines of engine accessory drive and mating male splines of starter drive shaft with grease (item 62, table 1–8).

(3) Place new gasket on mounting pad (starter) on engine and install on its mounting pad.

Note

Position starter so that terminal post (10, figure 5–61) is at 12 o'clock position.

(4) Secure starter to engine with nuts and washers. Tighten nuts to a torque of 280 to 300 inch-pounds.

(5) Position starter cable terminal on terminal post (10). Install flat washer, lockwasher, and castellated nut. Tighten castellated nut and secure with cotter pin.

(6) Slide nipple (16, figure 5–62) in place over terminal post (10, figure 5–61).

(7) Install and secure brackets (15 and 20, figure 5–62) and clamp (19).

e. Installation (with terminal cap). (1) Accomplish procedures as outlined in paragraph *d*, steps (1) through (4) above.

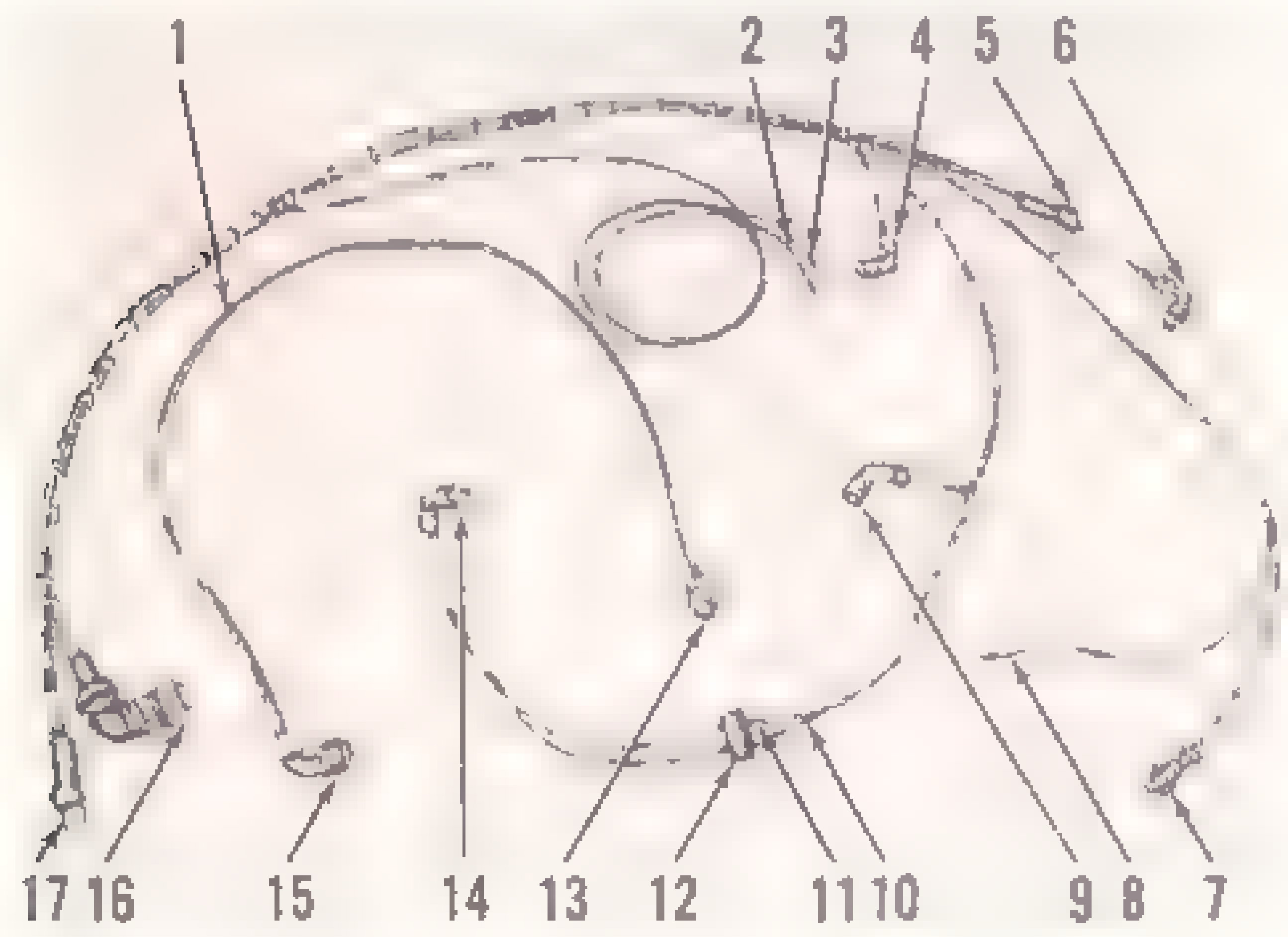
(2) Position terminal cap base over terminal post (10, figure 5–61) and secure with holddown nut.

(3) Insert starter cable terminal (5, figure 5–64) through large knurled nut and washer.

(4) Accomplish procedures outlined in paragraph *d*, step (5) above.

(5) Position split gasket around starter cable within end of starter terminal cap.

(6) Secure knurled nut to starter terminal cap by screwing snugly in a clockwise direction.



1. Conduit Assembly
2. Wire
3. Wire
4. Synchronizing Breaker Plug
5. Terminal
6. Tachometer Generator Plug
7. Oil Inlet Temperature Bulb Plug
8. Wire
9. Primer Solenoid Valve Plug
10. Wire
11. Wire
12. Terminal Block
13. Plug
14. Carburetor Air Inlet Temperature Plug
15. Plug
16. Plug
17. Terminal

Figure 5–64. Wiring harness and ignition conduit

(7) Install top half of starter terminal cap (10, figure 5–63) and secure with screws. Secure screws with lock wire.

(8) Install and secure brackets (15 and 20, figure 5–62) and clamp (19).

5–150. Starter Relay. On helicopters serial No. prior to 56-4313, the starter relay is located in the power relay junction box on the right side of the forward bulkhead of the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the starter relay is located behind the fuse and circuit breaker panel in the battery box. When the starter switch is actuated (depressed), the starter relay connects the primary supply circuit to the starter and the ignition induction vibrator simultaneously.

a. Removal. (1) Place BATT and IGNITION switches in OFF position. Disconnect battery leads from battery terminals, and disconnect external power source from external power receptacle.

(2) On helicopters serial No. prior to 56-4313, release fasteners and remove cover from power relay junction box. On helicopters serial No. 56-4313 and subsequent, remove cover from battery box and lower panel and shelf assembly.

(3) Remove nuts and washers securing primary bus bar. Remove primary bus bar and brass washers.

(4) Disconnect electrical wires from starter relay.

(5) Unfasten and remove starter relay.

b. Inspection. Inspect starter relay for corrosion, loose or missing components, stripped or damaged terminals, and indications of arcing, burning, or overheating.

c. Installation. (1) On helicopters serial No. prior to 56-4313, position starter relay in power relay junction box (located in electronics compartment) and secure in place. On helicopters serial No. 56-4313 and subsequent, position starter relay in panel and shelf assembly (located in battery box) and secure in place.

(2) Connect electrical wires to proper terminals on starter relay.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(3) Position brass washers and primary bus bar on starter relay, and secure with washers and nuts.

Note

If there is a variation in height of relays, build up lower relays with AN961-616 washers and AN341-616 nuts as required.

(4) On helicopters serial No. prior to 56-4313, install cover on power relay junction box and secure with

fasteners. On helicopters serial No. 56-4313 and subsequent, raise panel and shelf assembly into level position and secure.

Warning

Short circuits in power relay junction box or battery box may cause fires that would damage equipment or injure personnel. Before replacing covers, be sure all electrical connections are properly made and that no foreign objects are left in the power relay junction box or battery box.

(5) Connect battery.

(6) On helicopters serial No. 56-4313 and subsequent, install cover on battery box and secure with fasteners.

5—151. Starter Switch. The starter switch is located under the landing light control box on the forward end of the pilot's collective pitch control. The starter switch is marked START and, when depressed, energizes the starter and ignition induction vibrator through the starter relay. When the starter switch is released, the starter relay disconnects the starter and ignition induction vibrator from the primary supply circuit.

a. Removal. (1) Place BATT and IGNITION switches in OFF position. Pull out circuit breaker, marked STARTER, END PRM, OIL DIL, located on overhead fuse and circuit breaker panel.

(2) Remove screws and lockwashers securing landing light switch cover plate. Pull landing light switch cover plate from landing light switch housing to gain access to starter switch.

(3) Remove locknut and washer securing starter switch to landing light switch housing.

(4) Disconnect electrical wires from starter switch. Remove starter switch.

b. Inspection. Inspect starter switch for corrosion, bent or broken terminals, damaged threads; check button for proper operation.

c. Installation. (1) Insert starter switch in position in landing light switch housing with its button protruding out. Secure starter switch to landing light switch housing with locknut and washer.

(2) Connect electrical wires to proper terminals on starter switch.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(3) Position landing light switch cover plate on landing light switch housing and secure with screws and lockwashers.

(4) Reset circuit breaker, marked STARTER, ENG PRM, OIL DIL, located on overhead fuse and circuit breaker panel.

5—152. Ignition Harness Assembly. The ignition harness assembly consists of an ignition cable assembly (1, figure 5—65), a magneto-to manifold lead assembly (3), eighteen spark plug lead assemblies (7), and nine coil assemblies (10). The primary purpose of the ignition harness assembly is to electrically shield all ignition cables that carry the current discharged through the distributor block (magneto) directly to each spark plug. High frequency currents induced by ignition spark discharge, are confined to the inside surfaces of the ignition harness assembly and grounded, thus preventing interference waves from impairing reception of controlled radio frequency waves which are required for successful operation of receivers intended for directional devices on other electrical components. In addition, the ignition harness assembly protects insulated cables against mechanical damage such as chafing and abrasion; keeps moisture, oil, grease, gasoline, etc, away from electrical conductors on their insulation; and facilitates dissipation of heat for protection of cable insulation. Current generated and distributed in the magneto is passed at low tension through the ignition cable assembly to the coil assemblies, which are mounted on the intake rocker box housing of each cylinder under each cowl seal channel assembly (10, figure 5—1). The current is increased by the coil assemblies, and is passed at high tension to each of the two spark plugs (6, figure 5—65) per cylinder via the spark plug lead assemblies (7). Current from the magneto is routed to the ignition cable assembly (1) via the junction box (2), located at the front of the engine between cylinder No. 2 and No. 3, and the magneto-to-manifold lead assembly (3). The ignition cable assembly (1) is secured to studs mounted on the engine with nuts (12) and washers (13). The hinged end of each cowl seal channel assembly and each coil assembly is secured to the intake rocker box housing of each cylinder with bolts and washers. The magneto-to-manifold lead assembly (3) is connected to the magneto and ignition cable assembly and secured to the supercharger section of the engine with bolt (5) and lockwasher (4).

5—153. Inspection. A number of troubles may cause the engine to fail to start, idle properly, or develop full power, or may cause rough engine running. If the source of trouble has been traced to the ignition harness assembly, the most probable causes are defective spark plug terminals and/or defective ignition cables. Radio interference that would impair reception of radio or other communication signals can be caused by any loose or defective connection in the ignition harness assembly. Inspect ignition harness assembly as follows:

a. Inspect spark plug lead assemblies for proper connection between spark plugs and coil assemblies.

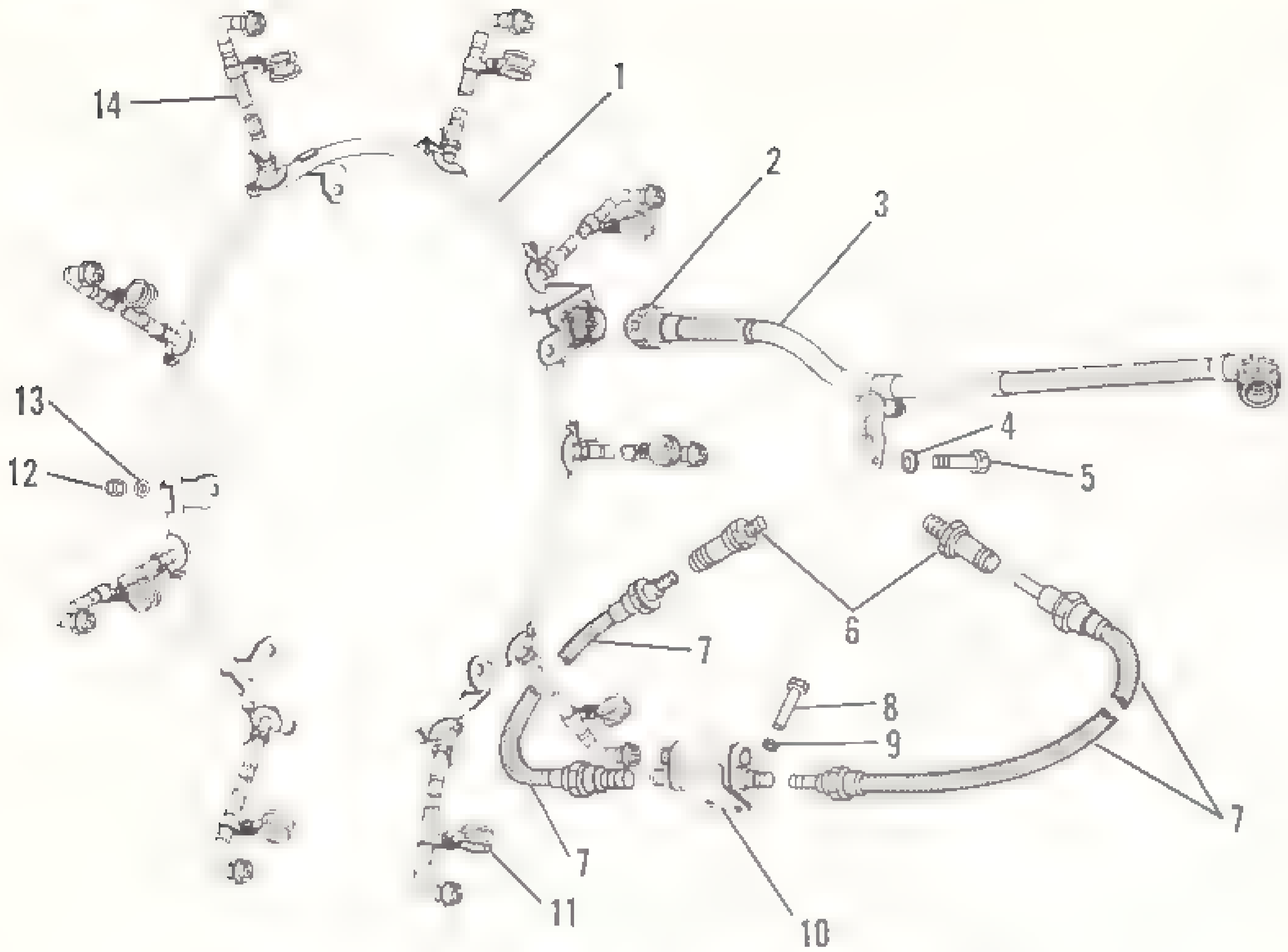


Figure 5–65. Ignition harness assembly and spark plugs

b. Inspect spark plug lead assemblies for chafing, corrosion, indications of burring, crimping, and fraying. Inspect coupling nuts of spark plug lead assemblies for cracks and distortion.

c. Inspect low-tension leads for proper connection between ignition cable assembly and coil assemblies. Inspect lock wire for breaks and security of attachment.

d. Inspect low-tension leads for chafing, corrosion, indications of burning, crimping, fraying, and security of mounting. Inspect coupling nuts of low-tension leads for cracks and distortion.

e. Inspect ignition cable assembly for cracks, punctures, holes, loose or broken outlets, loose or broken lugs, loose or broken clamps, loose or broken connector receptacle in junction box, corrosion, and security of attachment.

f. Inspect coil assemblies for cracks, punctures, indications of burning, corrosion, and security of attachment.

g. Inspect magneto-to-manifold lead assembly for proper connection between ignition cable assembly and magneto. Inspect lock wire for breaks and security of attachment.

h. Inspect magneto-to-manifold lead assembly for cracks, chafing, corrosion, indications of burning, crimping, fraying, and security of mounting.

i. Inspect fittings and elbows for damaged threads, sharp edges, burrs, and distorted mating surfaces.

5–154. Ignition Switch. The IGNITION switch is located on the main switch panel (located on the instrument panel) in the pilot's compartment. The face of the IGNITION switch is marked with four positions: BOTH, L, R, and OFF. When the IGNITION switch is in L position, the rear spark plugs are firing; when in R position, the front spark plugs are firing; and when in BOTH position, all spark plugs are firing.

5–155. Operational Check. a. Start engine in accordance with TM 55-1520-202-10.

Warning

Engine operation will be performed by authorized personnel only.

b. With engine idling smoothly at 900 to 1000 rpm, turn ignition switch to OFF position momentarily and then back to BOTH position again to ascertain that ignition switch turns engine off and on.

c. Place ignition switch in L position and back to BOTH, and then in R position and back to BOTH; a noticeable rpm drop should result.

d. Shut down engine in accordance with TM 55-1520-202-10.

5–156. Removal. a. Release fasteners and pull main switch panel from instrument panel.

b. Disconnect ignition conduit from back of ignition switch.

c. Remove cover from back of ignition switch and disconnect electrical leads. Ground electrical leads to helicopter structure.

Warning

Magneto is hot and spark plugs will fire, if engine crankshaft is turned, when electrical leads between magneto and ignition switch are disconnected at any point.

d. Remove screws securing ignition switch to main switch panel. Remove ignition switch.

5–157. Inspection. Inspect ignition switch for corrosion, loose or damaged terminals, proper operation of selector knob, and loose or damaged components.

5–158. Installation. a. Position ignition switch on main instrument panel and secure with screws.

b. Connect electrical leads to proper terminals on ignition switch.

Note

For correct electrical lead connections, refer to applicable wiring diagram.

c. Install cover on back of ignition switch and connect ignition conduit.

d. Position main switch panel on instrument panel and secure with fasteners.

5–159. Magneto. The engine has one low-tension, compensated-type, dual (left and right) magneto mounted on the supercharger rear cover. The purpose of the magneto is to supply sufficient current at the proper time, relative to crankshaft travel, so that equal distribution of current will be delivered to the spark plugs through the magneto-to-manifold lead assembly, ignition harness assembly, ignition coils, and spark plug leads. The right magneto fires the front spark plugs, and the left magneto fires the rear spark plugs. The magneto drive speed is 1-1/8 engine speed, and the booster (induction vibrator) firing time is 20 engine degrees later than normal engine timing (25 degrees BTDC). (See figures 5–66 and 5–67.)

5–160. Troubleshooting. For troubleshooting procedures for the magneto, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive drop-off during magneto check	Defective spark plug	Replace spark plug. (Refer to paragraphs 5–176 and 5–179.)
	Loose spark plug	Tighten spark plug. (Refer to paragraph 5–179, step e.)
	Excessive leakage in ignition harness	Check harness for leakage. (Notify direct support maintenance unit.)
	Worn or loose connections in harness	Tighten connections.
	Magneto points worn, pointed, or improperly set	Replace magneto. (Refer to paragraphs 5–162 and 5–164.)
	Leaking condenser	Replace magneto. (Refer to paragraphs 5–162 and 5–164.)

5–161. Operational Check. a. Start engine in accordance with TM 55-1520-202-10.

Warning

Engine operation will be performed by authorized personnel only.

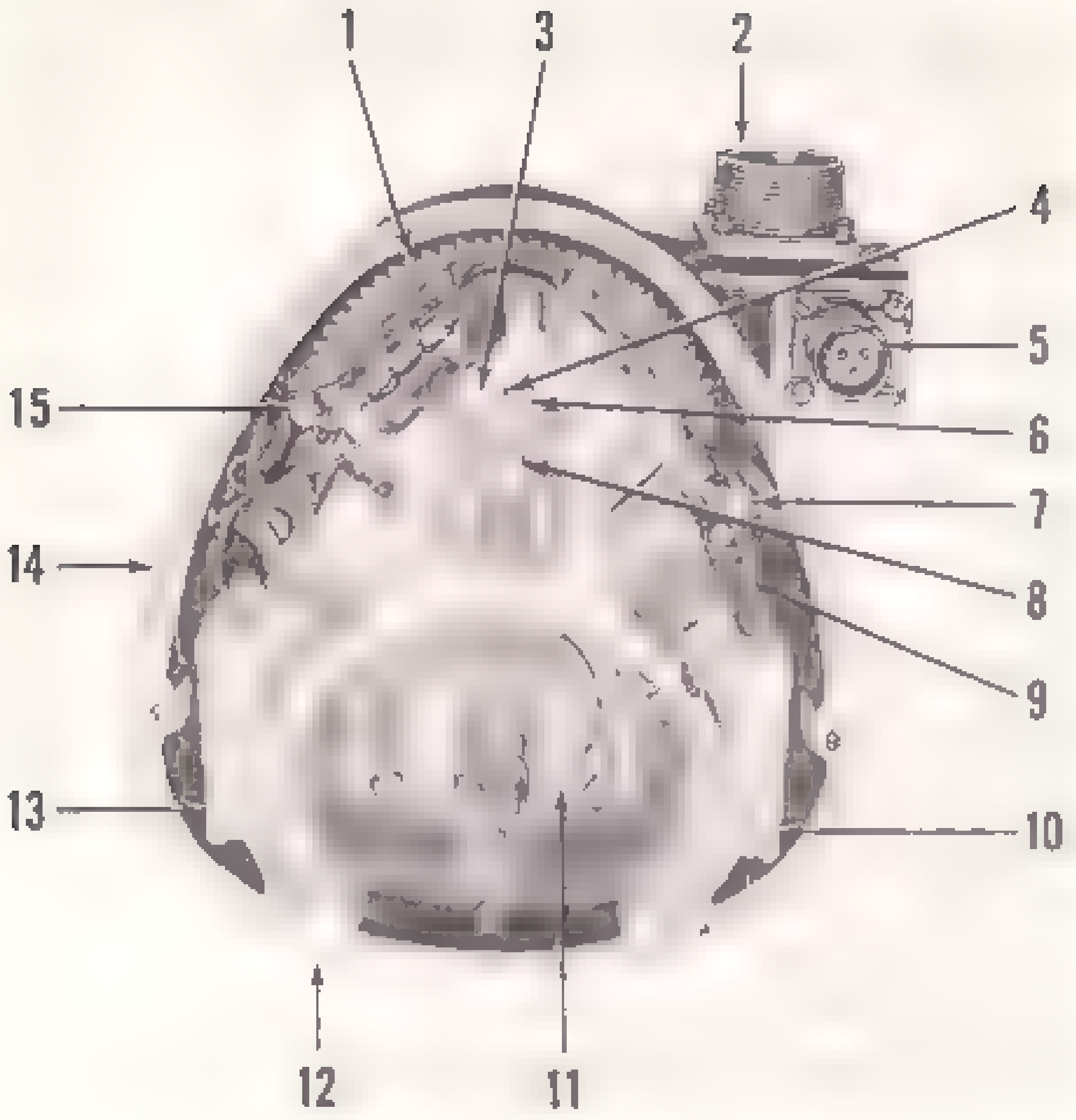
b. Check each magneto (left and right) at 2200 engine rpm and 25 inches Hg manifold pressure with IGNITION switch. Maximum allowable drop on either L (left) or R (right) magneto position (on IGNITION switch) is 75 engine rpm.

c. Shut down engine in accordance with TM 55-1520-202-10.

5–162. Removal. a. Place BATT switch in OFF position, fuel mixture control in CUT-OFF position, and IGNITION switch in OFF position. Shut off fuel supply to engine.

b. Disconnect magneto-to-manifold lead assembly (7, figure 5–68) from receptacle (2, figure 5–66) by removing lock wire and unscrewing coupling nut, using a suitable spanner wrench.

c. Remove lock wire from plug (2, figure 5–69) and disconnect plug from ignition switch and booster connection (1).



1. Distributor Rotor
2. Receptacle (Magneto-to-Manifold Lead Assembly)
3. Close – Main Breaker Timing Mark
4. Close – Booster Breaker Timing Mark
5. Receptacle (Induction Vibrator and Ground Wire Conduit)
6. Open – Main Breaker Timing Mark
7. Main Breaker Lead
8. Timing Points Aligned With Timing Mark 0 On Breaker Timing Plate
9. Main Breaker Lead
10. Condenser
11. Drive Gear (Distributor Rotor)
12. Breaker Housing
13. Condenser
14. Magneto Flange
15. Booster Breaker Lead

Figure 5–66. Magneto (cover removed)

Warning

Magneto is hot when plug (2) between magneto and ignition switch is connected.

d. Accomplish magneto timing check procedures as outlined in paragraph 5–165.

e. Support magneto and remove nuts and washers securing magneto to mounting pad on engine.

f. Pull magneto straight back from supercharger rear cover until magneto drive shaft and coupling are completely disengaged from magneto drive gear.

g. Remove packing from mounting flange of magneto. Discard packing.

h. Remove nuts securing band clamp assembly (5, figure 5–68). Remove band clamp assembly and magneto cover (6).

5–163. Inspection. a. Inspect receptacles for damaged threads, corrosion, cracked or damaged shells, loose or damaged socket contacts, and security of mounting.

b. Inspect magneto drive shaft for free rotation and side play. Inspect coupling (splined) for cracks, corrosion, and security.

c. Inspect magneto flange for corrosion, distortion, cracks (especially at mounting flange), and loose or damaged sealing strip.

d. Inspect distributor rotor and drive gear for cracked or broken teeth and security of mounting.

e. Inspect breaker cams for grooving, scoring or scratches, cracks, and security of mounting.

f. Inspect main and booster breaker leads for frayed or damaged insulation, breaks, and security of mounting.

g. Inspect condensers and condenser leads for damage and security of mounting.

h. Inspect breaker housing for cracks, corrosion, and security of mounting.

i. Inspect main and booster assemblies as follows:

Caution

Do not remove breaker assemblies to perform inspections listed below. If a breaker assembly is removed or loose in mounting, magneto must be replaced.

(1) Inspect breaker assemblies for security of mounting.

(2) Inspect for torn, loose, or deteriorated felt (2, figure 5–70).

(3) Inspect felt securing thread (3) for fraying, breaks, and security of mounting.

(4) Inspect for cracked, split, or scored condition on cam riding surfaces of fiber block (1), and check rivets securing fiber block for looseness.

(5) Inspect for excessively worn or battered condition of fiber block (1) at point where fiber block contacts main spring.

(6) Inspect breaker assembly contacts for excessive burning, deep pits, and improper mating.

j. Inspect band clamp assembly for cracks, dents, corrosion, damaged threads, and loose or damaged components.

k. Inspect magneto cover for cracks, distortion, corrosion, and uneven or damaged mating surfaces.

5–164. Installation. a. Check magneto model to insure that it is correct for engine.

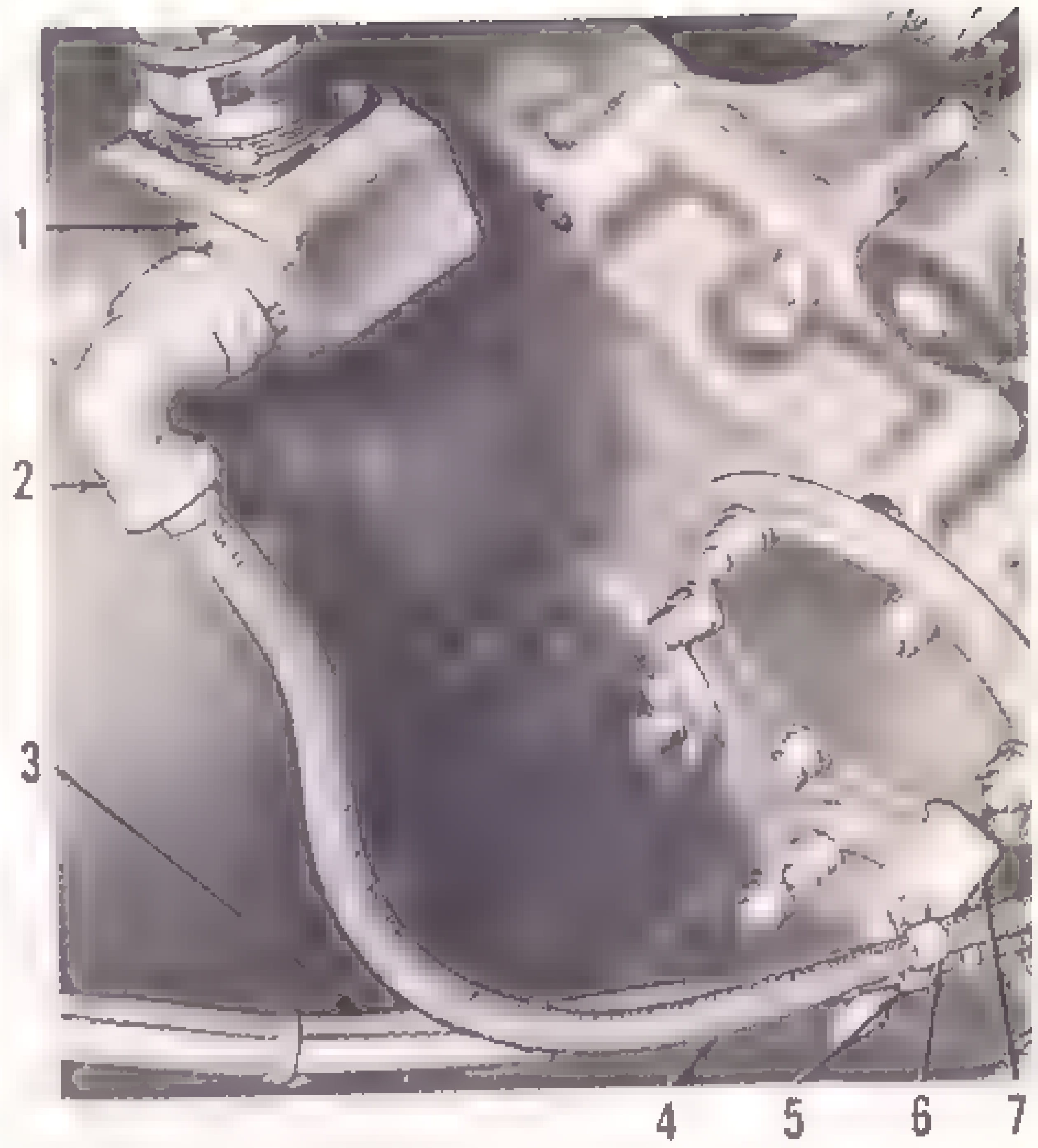
Note

Use magneto model D9LN-2 on R1820-34A and R1820-34C engines.

Figure 5—67. Magneto electrical distribution

1. Fluid Pump Drive Adapter
2. Left Accessory Drive Cover
3. Carburetor Port Cover
4. Main Oil Pressure Transmitter Flange
5. Band Clamp Assembly
6. Magneto Cover
7. Magneto-to-Manifold Lead Assembly

Figure 5–68. Supercharger rear section



1. Ignition Switch and Booster Connection
2. Plug
3. Wiring Harness
4. Ignition Conduit Assembly
5. Clamp
6. Clamp
7. Bracket

Figure 5–69. Ignition conduit assembly (installed)

b. Remove band clamp assembly (5, figure 5–68) and magneto cover (6) from magneto. Check magneto to insure that breaker assemblies are properly synchronized.

Caution

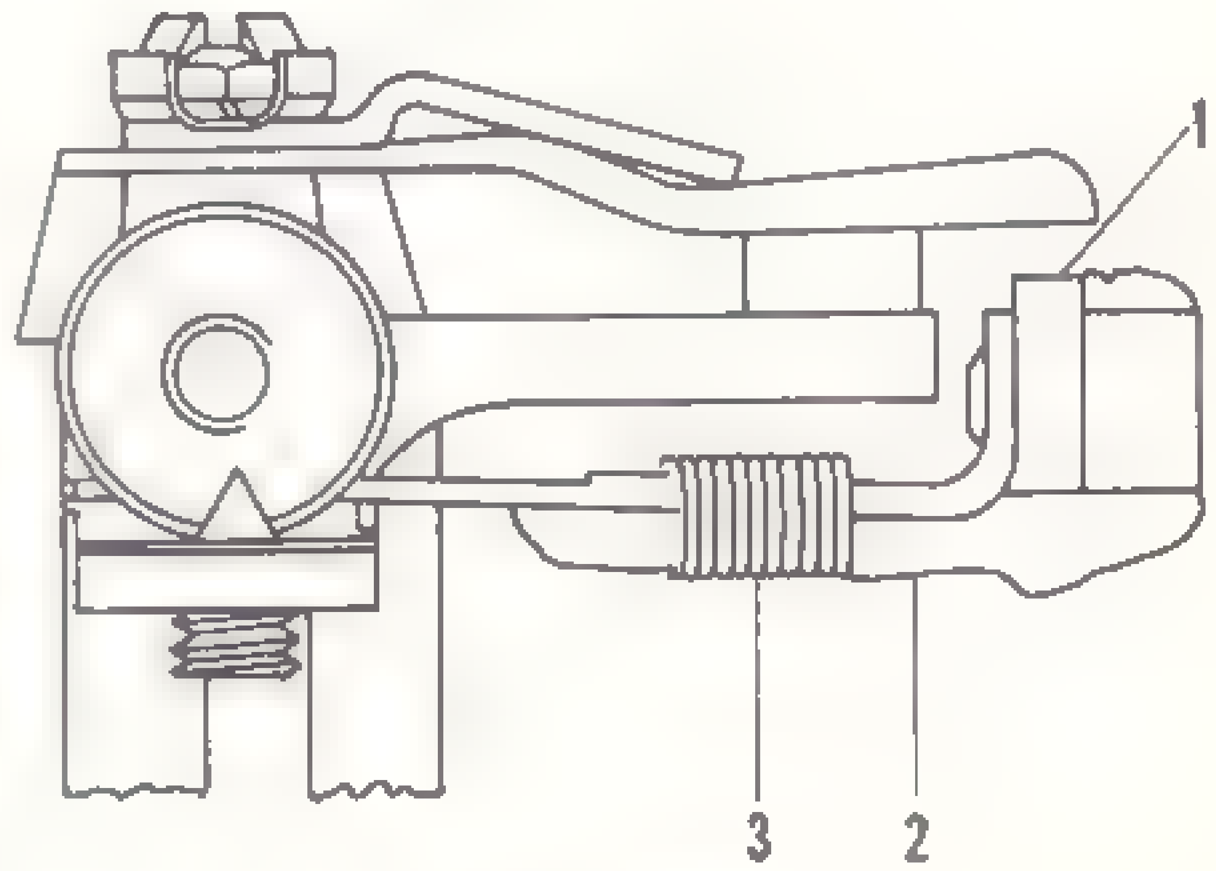
At no time will breaker assemblies be adjusted to achieve synchronization. A new or newly overhauled magneto should be correctly timed internally. When faulty internal timing is suspected, replace magneto.

c. Insure that magneto mounting pad (engine) on supercharger rear cover is clean and dry. Insure that mounting flange on magneto is clean and dry.

d. Coat magneto drive shaft coupling splines and magneto drive gear splines (engine) with grease (item 62, table 1–8).

e. Place new packing on mounting flange of magneto.

f. Check to insure engine has not been turned from its cylinder No. 1 piston position at 25 degrees before top dead center on compression stroke by pushing slide pointer upward until it touches pivot arm. Scale reading at this point should be 25 degrees. (Refer to paragraph 5–165, steps *a* and *c* through *i*, to position cylinder No. 1 25 degrees before top dead center on compression stroke.)



1. Fiber Block
2. Felt
3. Felt Securing Thread

Figure 5–70. Cam follower

g. Manually turn magneto drive shaft until timing pointer aligns with 0 (open) mark on breaker timing plate located on breaker housing. With timing pointer in this position, install magneto on its mounting pad. Center mounting studs in elongated holes of magneto mounting flange to facilitate future adjustments. If mounting studs cannot be centered without disturbing timing pointer and 0 (open) mark alignment, remove magneto and readjust coupling (splined) on magneto drive shaft as follows:

Note

Align timing pointer (8, figure 5–66) with timing mark 0 on breaker timing plate.

(1) Remove cotter pin and nut securing coupling (splined) on magneto drive shaft.

Note

Use a suitable spline wrench to hold coupling while nut is being removed.

(2) Remove coupling (splined) from magneto drive shaft and reinstall it one spline forward or reverse of its original position. Install coupling and nut; tighten nut fingertight; install magneto on its mounting pad. Repeat this procedure until desired alignment is obtained.

(3) Using a suitable spline wrench to hold coupling (splined), tighten nut to a torque of 120 to 140 inch-pounds and secure with new cotter pin.

(4) Install magneto on its mounting pad and secure with washers and nuts.

Note

To allow magneto to be shifted for future adjustments, tighten nuts fingertight. Insure that timing pointer aligns with 0 mark on breaker timing plate.

h. Accomplish procedures as outlined in paragraph 5–165, steps *k* through *n*.

i. Shift magneto, if necessary, to right or left so that points of main breaker assemblies open within plus 1, minus 2 degrees of basic timing position, 25 degrees before top dead center on compression stroke.

Caution

At no time will main breaker assemblies be adjusted to achieve synchronization or to retime magneto within plus 1, minus 2 degrees of basic timing position, 25 degrees before top dead center on compression stroke. If magneto cannot be correctly timed, replace magneto.

j. Tighten nuts securing magneto to its mounting pad. Recheck timing to insure that tightening operation has not shifted magneto and altered timing.

k. Before removing piston position indicator from cylinder No. 1, rotate propeller shaft so that piston again passes through top dead center position. Check scale reading; slide pointer reference mark should be opposite zero (0) degree mark on scale.

l. Disconnect timing light wires from piston position indicator. Remove piston position indicator.

m. Remove timing light wires from main breaker assemblies. Connect primary leads to main breaker assemblies. Connect booster breaker lead to booster breaker assembly.

n. Install magneto cover (6, figure 5–68) and band clamp assembly (5). Tighten band clamp assembly nuts to a torque of 60 to 65 inch-pounds.

o. Connect plug (2, figure 5–69) to ignition switch and booster connection (1). Secure plug with lock wire.

p. Connect magneto-to-manifold lead assembly (7, figure 5–68) to receptacle (2, figure 5–66) with coupling nut. Tighten coupling nut to a torque of 275 to 300 inch-pounds.

q. Install front spark plugs in cylinders. (Refer to paragraph 5–179.)

r. Perform operational check as outlined in paragraph 5–161.

5–165. Magneto Timing Check. Before removing and installing magneto, check for correct magneto timing as follows:

Note

Before installing magneto, accomplish steps *a* and *c* through *j*. After installing magneto, accomplish steps *b* and *k* through *o*.

a. Place BATT switch in OFF position, fuel mixture control in CUT-OFF position, and IGNITION switch in OFF position. Shut off fuel supply to engine.

b. To insure against inadvertent engine firing during magneto timing check, disconnect magneto-to-manifold lead assembly (7, figure 5–68) from receptacle (2, figure 5–66) by removing lock wire and loosening coupling nut, using a suitable spanner wrench.

c. To relieve pressure in cylinders and to facilitate ease of engine rotation during magneto timing check, remove front spark plugs from all cylinders. (Refer to paragraph 5–176.)

d. Turn engine propeller shaft slowly in direction of rotation until piston in cylinder No. 1 starts to come up on compression stroke.

e. Utilizing piston position indicator unit, install pivot arm, part No. 1-205-B, or equivalent, hook end up, and scale, part No. 1-209-2, or equivalent, on piston position indicator.

Caution

It is imperative that correct parts for applicable engine model be installed on piston position indicator.

f. Install piston position indicator in front spark plug insert of cylinder No. 1. Turn cap on piston position indicator until slot is parallel with vertical axis of cylinder, and scale is at right of slot (viewed facing engine). Push slide pointer to top of slot so that it makes contact with pivot arm.

g. Turn propeller shaft slowly in direction of normal rotation until piston in cylinder No. 1 passes through top dead center position, indicated by pivot arm starting to rise in slot. Slide pointer will cease to travel as soon as piston has reached top dead center.

h. Set zero (0) degree mark on scale opposite slide pointer reference mark.

Note

Once the scale position has been established, it must not be moved during the remaining portion of the magneto timing check.

i. Turn propeller shaft in opposite direction of normal rotation approximately one-quarter of a revolution. Move slide pointer until it is opposite 25-degree mark on scale. Turn propeller shaft slowly in direction of normal rotation until pivot arm just touches slide pointer. Bulb in piston position indicator will light at contact, signifying that piston is at 25 degrees before top dead center on compression stroke. Check to insure that slide pointer has not traveled beyond 25-degree position. When this position has been determined, move slide pointer down away from pivot arm to disconnect circuit through pivot arm and scale.

Note

Once the piston is located at 25 degrees before top dead center on compression stroke, do not turn propeller shaft or move scale until required to do so.

j. Remove nuts securing band clamp assembly (5, figure 5—68). Remove band clamp assembly and magneto cover (6).

k. Disconnect primary coil leads from each main breaker assembly. Disconnect booster breaker lead from booster breaker assembly to avoid false magneto timing indications.

l. Attach a timing light wire to each main breaker assembly. Insert pin ends of timing light wires to pin jacks on face of piston position indicator.

m. Turn propeller shaft about 90 degrees in opposite direction of normal rotation to eliminate backlash of engine and magneto gears. Main breaker assemblies should close and timing lights go on. Push slide pointer down away from pivot arm.

n. Turn propeller shaft slowly in direction of engine rotation until both timing lights on piston position indicator go out within 2 degrees of engine rotation of each other, indicating that both main breaker assemblies are beginning to open. Push up slide pointer until it just touches pivot arm, and note position on scale. If magneto is correctly timed, slide pointer will be within plus 1, minus 2 degrees of 25-degree mark on scale, and timing pointer of magneto will align with 0 (open) mark on breaker housing.

o. Disconnect timing light wires from main breaker assemblies and connect primary leads to main breaker assemblies. Connect booster breaker lead to booster breaker assembly.

5—166. Induction Vibrator. The induction vibrator, mounted just aft of the left nose door frame, supplies 27-volt, 2.7-ampere, pulsating current to the primary coil of the magneto to aid in providing sufficient current when starting the engine. After the engine starts, the magneto takes over the function of the induction vibrator. The starter switch controls the operation of the induction vibrator.

Note

For maintenance procedures for the starter switch, refer to paragraph 5—151.

5—167. Removal. a. Disconnect conduits (2 and 5, figure 5—71) from induction vibrator (3).

b. Remove cover from face of induction vibrator (3) and disconnect electrical leads.

c. Remove screws and washers securing induction vibrator (3). Remove induction vibrator.

5—168. Inspection. Inspect induction vibrator for cracks, dents, corrosion, loose or damaged components, and indications of arcing or burning.

5—169. Installation. a. Insure that mounting surfaces (induction vibrator and mounting bracket) are clean and dry.

Note

The induction vibrator is automatically grounded when installed and secured.

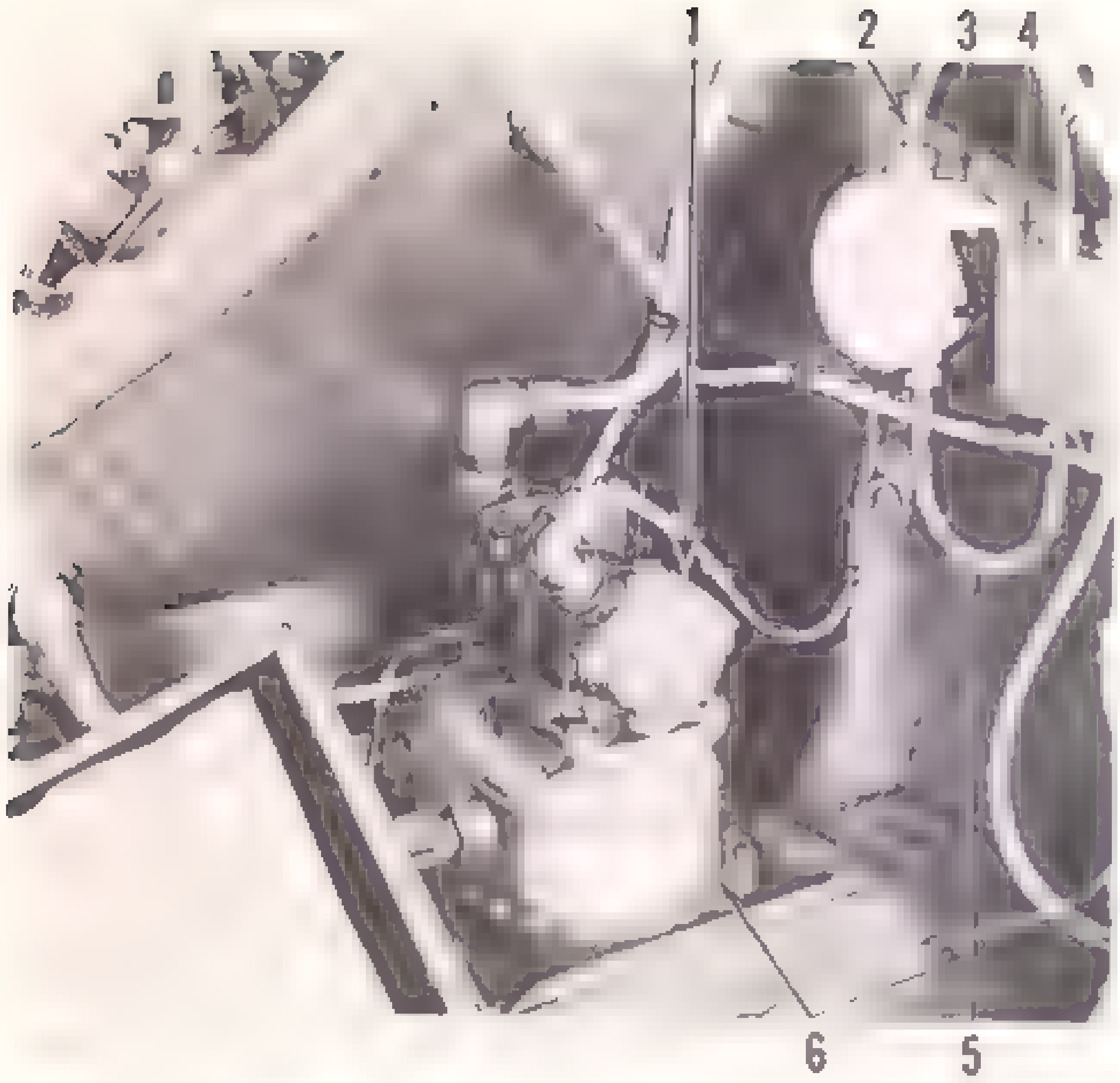
b. Position induction vibrator (3, figure 5—71) on mounting bracket and secure with screws and washers.

c. Connect electrical leads to proper terminals on induction vibrator (3).

Note

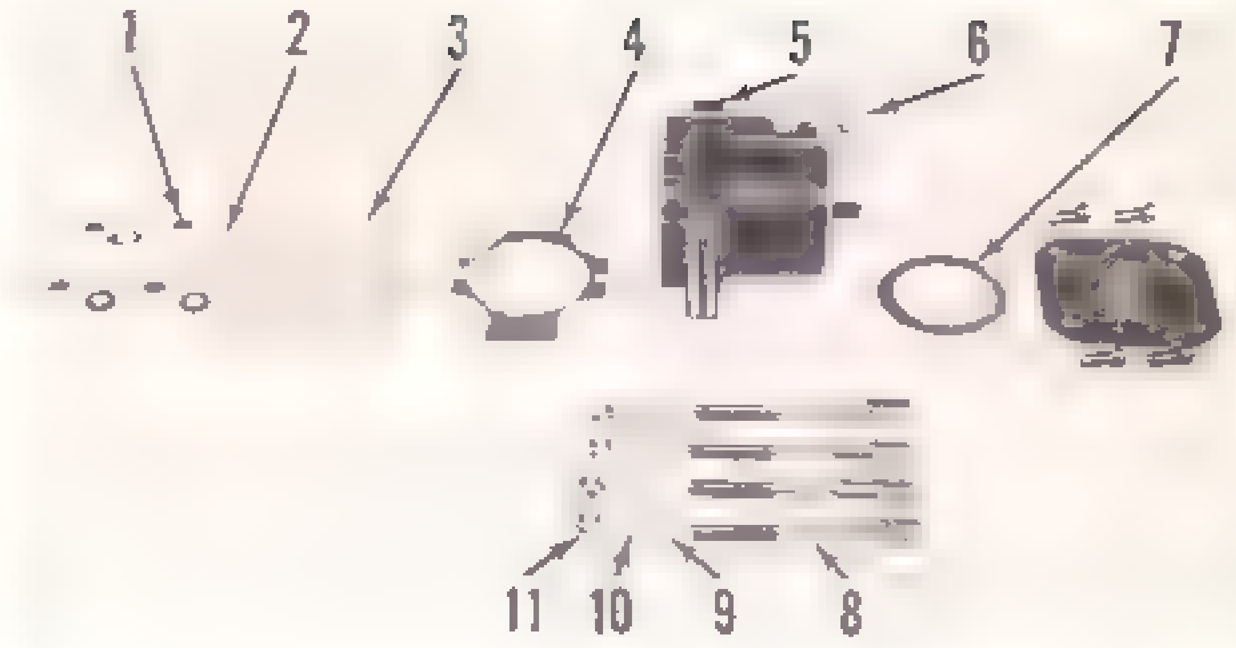
For correct electrical lead connections, refer to applicable wiring diagram.

d. Install cover on face of induction vibrator (3) and connect conduits (2 and 5) to induction vibrator.



1. Clutch Pump
2. Conduit
3. Induction Vibrator
4. Junction Box
5. Conduit
6. Oil Cell Cover

Figure 5–71. Induction vibrator installed



1. Nut
2. Washer
3. Breaker Cover
4. Gasket
5. Breaker Assembly
6. Electrical Outlet
7. Gasket
8. Hex Studs
9. Washer
10. Lock Washer
11. Hex Nut

Figure 5–72. Synchronizing breaker installation

5–170. Synchronizing Breaker. The synchronizing breaker (12, figure 5–61) is installed on the right tachometer generator drive pad located on the rear oil pump. The synchronizing breaker is used in conjunction with a portable ignition analyzer when checking timing of the ignition system.

5–171. Removal. a. Place BATT and IGNITION switches in OFF position. Disconnect portable ignition analyzer, if connected, from ignition analyzer receptacle.

b. Remove lock wire and disconnect electrical plug from synchronizing breaker (12, figure 5–61).

c. Remove nuts (1, figure 5–72) and washers (2) securing breaker cover (3) and gasket (4) to breaker assembly (5). Remove breaker cover and gasket.

d. Remove hex nuts (11), lockwashers (10), and washers (9) from hex studs (8) extending through elongated holes in flange of breaker assembly (5).

e. Remove breaker assembly (5) from drive pad and hex studs (8).

Note

The hex studs (8) are installed on the right tachometer generator drive pad studs.

f. Remove gasket (7) by sliding gasket over pilot of breaker assembly (5).

g. Place protective cover over right tachometer generator drive pad.

5–172. Installation. a. Remove protective cover from right tachometer generator drive pad. Insure that right tachometer generator drive pad surface is clean and free of dents, marks, or abrasions.

b. Place gasket (7, figure 5–72) over pilot of breaker assembly (5). Position breaker assembly on hex studs (8), with electrical outlet (6) pointing to right and forward.

Note

Make certain that the housing of breaker assembly (5) is seated squarely against the right tachometer generator drive pad.

The hex studs (8) are installed on the right tachometer generator drive pad studs.

c. Install washers (9), lockwashers (10), and hex nuts (11) on hex studs (8). Tighten hex nuts fingertight to facilitate future adjustments.

d. Synchronize and time synchronizing breaker as outlined in paragraph 5–173, steps *d* through *n*.

e. Tighten hex nuts (11) to a torque of 40 to 45 inch-pounds.

Note

Insure that hex studs (8) are properly secured with lock wire.

f. Position gasket (4) and breaker cover (3) on breaker assembly (5), and secure with nuts (1) and washers (2). Tighten nuts to a torque of 65 inch-pounds.

g. Connect electrical plug to synchronizing breaker (12, figure 5–61). Secure electrical plug with lock wire.

5–173. Synchronizing and Timing Synchronizing Breaker.

a. Place BATT and IGNITION switches in OFF position. Disconnect portable ignition analyzer, if connected, from ignition analyzer receptacle.

b. Disconnect electrical plug from synchronizing breaker (12, figure 5–61).

c. Remove nuts (1, figure 5–72) and washers (2) securing breaker cover (3) and gasket (4) to housing of breaker assembly (5). Remove breaker cover and gasket, and loosen hex nuts (11) securing breaker assembly.

d. Install piston position indicator in cylinder No. 1 and establish zero-degree reference mark as outlined in paragraph 5–165, steps *a* and *c* through *h*.

e. After zero-degree reference is established, turn propeller shaft (clutch fan assembly) in opposite direction of normal rotation approximately one-quarter revolution. Move slide pointer of piston position indicator until it is opposite 35-degree mark on scale. Turn propeller shaft (clutch fan assembly) slowly in direction of normal rotation until pivot arm just touches slide pointer. Bulb in piston position indicator will light at contact, signifying that piston is at 35 degrees before top dead center on compression stroke. Check to insure that slide pointer has not traveled beyond 35-degree position. When this position (35-degree) has been determined, move slide pointer down away from pivot arm to disconnect circuit through pivot arm and scale.

Note

Once piston is located at 35 degrees before top dead center on compression stroke, do not turn propeller shaft (clutch fan assembly) or move scale until required to do so.

f. Connect timing light to A and B pins on electrical connector of synchronizing breaker (12, figure 5–61).

g. Insert socket wrench on drive shaft of synchronizing breaker, and pull drive shaft out of camshaft until splines are disengaged.

h. Hold drive shaft of synchronizing breaker stationary. Turn cam assembly by means of bearing retainer nut in direction of normal rotation of synchronizing breaker until timing light indicates that contact points have just closed.

i. Release drive shaft of synchronizing breaker and make certain that it properly engages cam splines.

j. Use socket wrench on hex end of drive shaft of synchronizing breaker to hold out backlash in engine gear train.

Note

Make certain that all backlash is held out in a direction opposite to normal rotation of the drive shaft (synchronizing breaker). Direction of rotation of the propeller shaft (clutch fan assembly) is clockwise.

k. Rotate housing of breaker assembly (5, figure 5–72) until timing light indicates contact points have just closed. Tighten hex nuts (11) to a torque of 40 to 45 inch-pounds.

l. Check timing of synchronizing breaker as follows:

(1) Turn propeller shaft (clutch fan assembly) one-quarter revolution in opposite direction of normal rotation. Then turn propeller shaft (clutch fan assembly) in direction of normal rotation until contact points close as indicated by timing light. Push up slide pointer of piston position indicator until it just touches pivot arm and note position on scale. If synchronizing breaker is correctly timed, slide pointer will be opposite 35-degree mark on scale.

Note

Use a 9/32 socket wrench on the hex end of the drive shaft (synchronizing breaker) to hold out the backlash in engine drive gear train. Be sure the backlash is held out in the direction opposite to normal rotation of the drive shaft.

(2) If timing light indicates contact points closing at 35 degrees before top dead center on compression stroke, the synchronizing breaker is correctly synchronized and timed to the engine. If the timing light indicates contact point closure at other than 35 degrees before top dead center position, readjust synchronizing breaker as outlined in steps *d* through *k* above.

(3) Remove 9/32 socket wrench from hex end of drive shaft (synchronizing breaker).

m. Disconnect timing light from A and B pins on electrical connector of synchronizing breaker (12, figure 5–61).

n. Remove piston position indicator from cylinder No. 1. Install spark plugs. (Refer to paragraph 5–179.)

o. Position gasket (4, figure 5–72) and breaker cover (3) on breaker assembly (5) and secure with nuts (1) and washers (2). Tighten nuts to a torque of 65 inch-pounds.

Note

Insure that hex studs (8) are secured with lock wire.

p. Connect electrical plug to synchronizing breaker (12, figure 5–61). Secure electrical plug with lock wire.

5–174. Spark Plugs. Two 18-mm, 3/4-20 (spark plug connection), ceramic-insulated spark plugs are installed in each cylinder of the engine. The spark plugs are radio-shielded to prevent radio noise interference.

5–175. Troubleshooting. For troubleshooting procedures for the spark plugs, proceed as follows:

Note

Massive wire spark plugs that are fouled, dirty, *damaged, or have improper gap setting will be* replaced with serviceable plugs.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Spark plugs (fine wire electrodes) malfunctioning	Carbon coating	Clean spark plug. (Refer to paragraph 5–177.)
	Improper gap setting	Regap spark plug. (Refer to paragraph 5–177, step *d*.)
	Loose spark plug lead connector	Tighten spark plug lead connector.
	Corroded or damaged ignition cable	Notify direct support maintenance unit.
	Burned or damaged electrodes	Replace spark plug. (Refer to paragraphs 5–176 and 5–179.)
	Damaged spark plug	Replace spark plug. (Refer to paragraphs 5–176 and 5–179.)
Engine fails to idle properly	Loose spark plug	Tighten spark plug. (Refer to paragraph 5–179.)
	Damaged spark plug	Replace spark plug. (Refer to paragraphs 5–176 and 5–179.)
	Improper gap setting (fine wire spark plug)	Regap spark plug. (Refer to paragraph 5–177, step *d*.)
Rough-running engine	Loose spark plug	Tighten spark plug. (Refer to paragraph 5–179.)
	Damaged spark plug	Replace spark plug. (Refer to paragraphs 5–176 and 5–179.)
	Improper gap setting (fine wire spark plug)	Regap spark plug. (Refer to paragraph 5–177, step *d*.)
	Dirty spark plugs (fine wire spark plug)	Clean spark plugs. (Refer to paragraph 5–177.)
Dead cylinder	Damaged spark plugs	Replace spark plugs. (Refer to paragraphs 5–176 and 5–179.)
	Loose spark plug	Tighten spark plug. (Refer to paragraph 5–179.)
Loss of compression	Loose spark plug	Tighten spark plug. (Refer to paragraph 5–179.)
	Loose or damaged spark plug insert (cylinder)	Notify direct support maintenance unit.
	Damaged spark plug gasket	Replace spark plug gasket. (Refer to paragraphs 5–176 and 5–179.)
Detonation	Loose spark plug	Tighten spark plug. (Refer to paragraph 5–179.)

5–176. *Removal.* *a.* Disconnect spark plug lead from each spark plug. Install a suitable protector on disconnected end of each spark plug lead.

Caution

When withdrawing spark plug lead connector from spark plug, care must be taken to pull spark plug lead connector straight out and in line with centerline of spark plug barrel; otherwise, a side force is applied which may cause damage to the barrel insulator (spark plug) and spark plug lead connector. Should the spark plug lead connectors be difficult to remove in this manner, the resisting contact between the neoprene sleeve and the barrel insulator can be broken easily by twisting the neoprene sleeve. (See figure 5–73.)

b. Remove spark plug from cylinder, using a suitable spark plug wrench. Remove spark plug gasket and discard. Place spark plug in a suitable tray or rack.

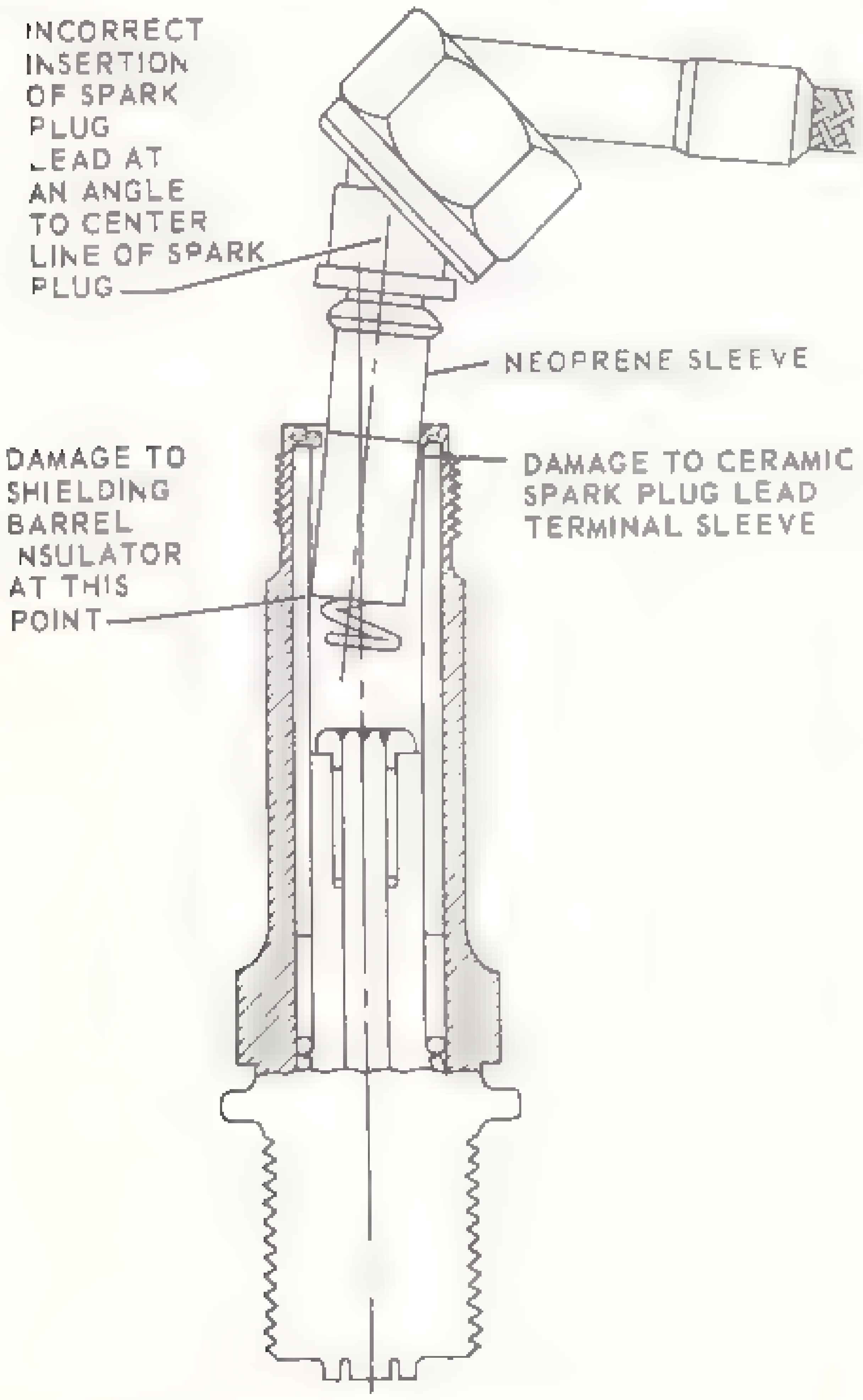


Figure 5–73. Results of improperly installed spark plug lead

Note

If spark plug is seized or difficult to remove, proceed to step *d.*

c. Install a suitable protector plug in spark plug insert (cylinder).

d. A spark plug that is seized or difficult to remove may be removed by one of following methods:

(1) Insert a tube from opposite spark plug insert and apply carbon dioxide (CO_2) on seized spark plug. This will cool spark plug and cause contraction at bottom threads so that spark plug may be easily broken loose with a suitable spark plug wrench. (See figure 5–74.)

(2) Use a conical metal adapter which has a hole at apex just large enough to accommodate spark plug; by placing funnel of a carbon dioxide (CO_2) bottle in adapter, carbon dioxide (CO_2) will chill and contract spark plug which may then easily be broken loose with a suitable spark plug wrench. A warm cylinder head at time of carbon dioxide application is sometimes desirable. (See figure 5–75.)

(3) A mixture of ether (item 70, table 1–8) and penetrating oil (item 71, table 1–8) may loosen hard carbon sufficiently to permit removal of spark plug.

(4) Often an excessively tight spark plug can be removed in one piece if vibration by hand or with an electric or air-driven vibrating hammer is applied to spark plug as pressure is exerted on spark plug wrench in a loosening direction.

e. If a spark plug is sheared during removal, the cylinder normally will require replacement, as the resulting damage to the threads of the spark plug insert

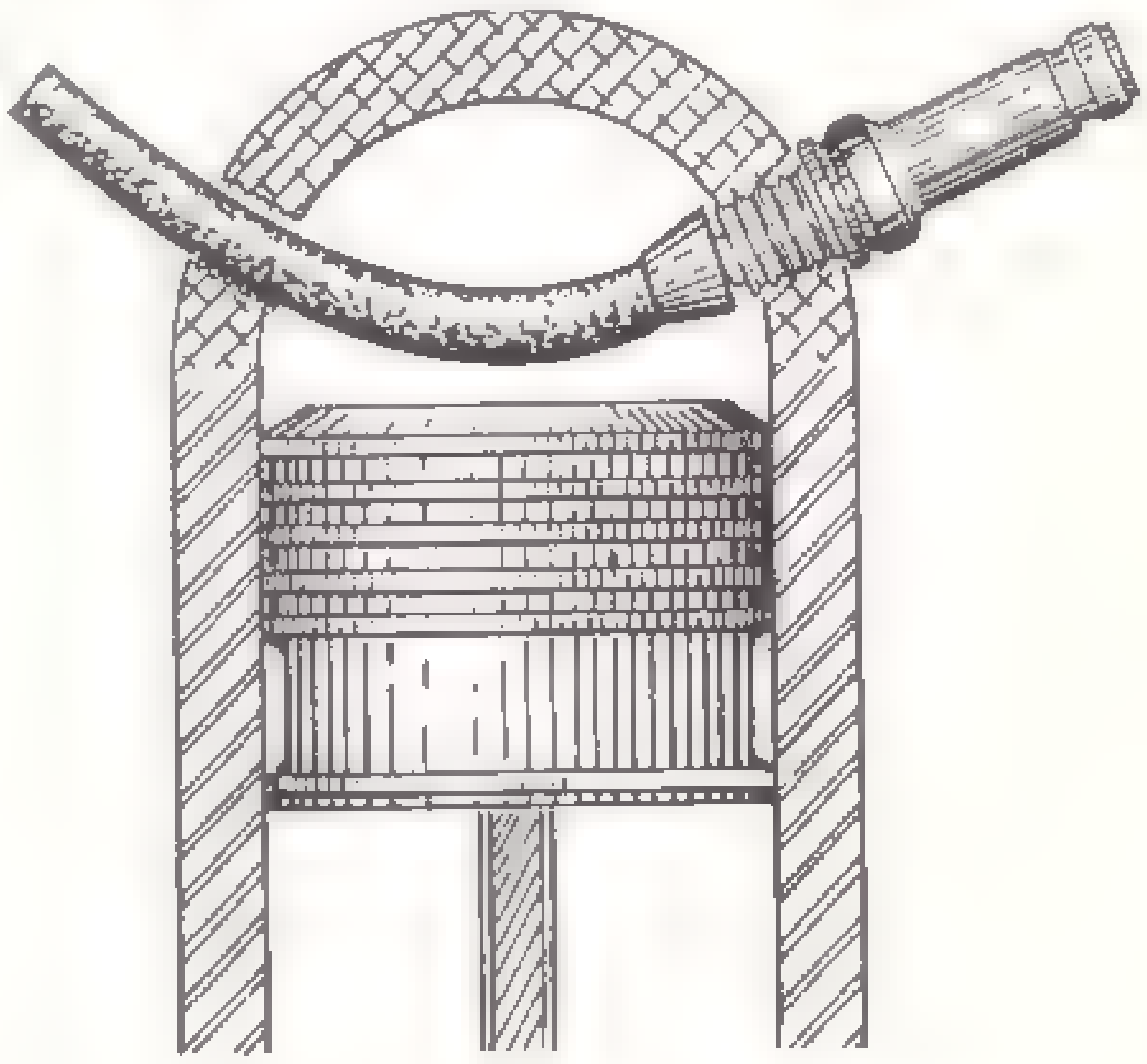


Figure 5–74. Removal of seized spark plug

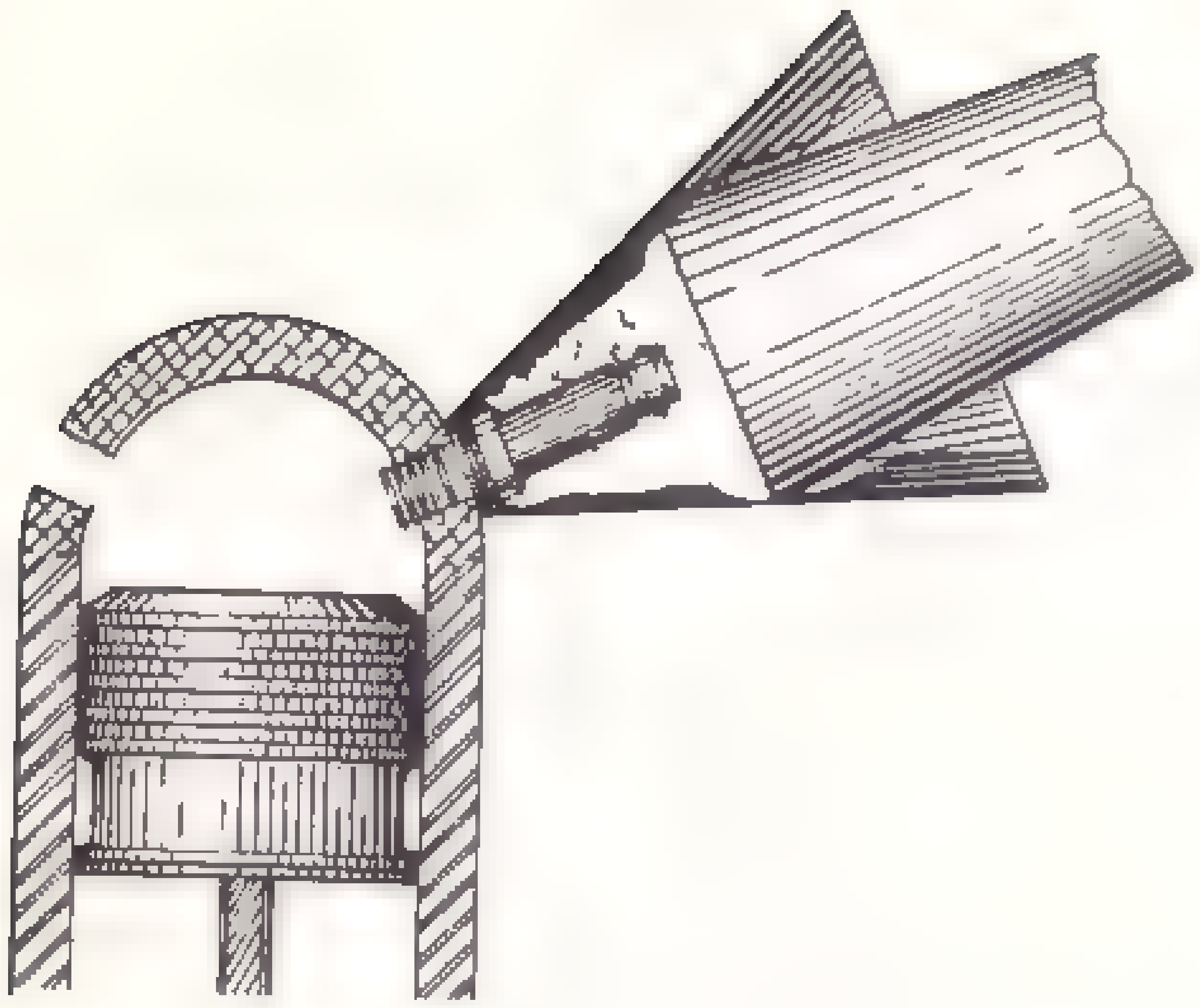


Figure 5–75. Alternate method of removing seized spark plug

(cylinder) make it unsuitable for installation of a replacement spark plug.

Note

If the spark plug shears easily upon attempted removal, this may be attributed to the fact that the spark plug was cracked during previous installations by excessive torque. Sometimes the threaded portion of a sheared spark plug may be backed out of the spark plug insert (cylinder) by inserting a screwdriver between the ground electrodes. In most cases, a screw-type remover will be required.

5–177. Cleaning. a. Clean electrodes and firing chamber of fine wire spark plugs only, using fine wire spark plug cleaning equipment listed in table 5–4.

Caution

No attempt shall be made to disassemble a spark plug during cleaning.

Note

No cleaning will be performed on spark plugs having the following defects: fouled or dirty massive wire spark plugs, spark plugs with visible damage to center electrode insulator or shielding barrel insulator, and spark plugs with damaged threads. Spark plugs with any of above defects will be replaced with serviceable spark plugs.

b. Clean threads of spark plugs with a stiff brush (not wire) and naphtha (item 16, table 1–8) or unleaded gasoline (item 64, table 1–8). Dry thoroughly with a lint-free cloth.

c. Clean shielding barrel insulator with a lint-free cloth moistened with naphtha (item 16, table 1–8) or unleaded gasoline (item 64, table 1–8) and dry thoroughly with a clean, dry, lint-free cloth.

Caution

Under no circumstances should leaded gasoline or carbontetrachloride be used.

d. After cleaning, set gap of fine wire spark plugs to $0.016^{+0.002}_{-0.001}$ inch, using gap setting equipment listed in table 5–4.

Table 5–4. Fine wire spark plug cleaning and gap setting equipment

FEDERAL STOCK NO.	PART NO.	NOMENCLATURE	QUANTITY
4910-786-9271	5612478	Kit, Fine Wire Spark Plug	
*4910-787-4332	5610523	Chest	1
*4910-787-0929	AV11-1	Cleaner and Indicator	1
*4910-787-4334	AV19-3	Vibrator Unit	1
*4910-787-4326	CL-248	Cleaning Tool	1
*4910-787-4327	AV20-3	Gapping Tool	1
*4910-787-4325	CL-258	Gap Spacers	4
*4910-787-4328	AV-14-1	Gap Gauge	2
*4910-787-4329	AV-17-1	Cleaning Tool Assy	1
*4910-787-0930	CL-241	Cleaning Tool	6
*4910-787-4333	AV-7-1	Cleaning Compound	1
*4910-787-4331	CL-73	Nozzle Package	1
*		Instruction Book	1

*Components of fine wire spark plug kit, part No. 5612478, FSN 4910-786-9271.

Caution

No attempt will be made to set the gap of massive wire spark plugs, as damage to the center electrode insulator or electrodes may result. Replace massive wire spark plugs having incorrect gap setting with serviceable spark plugs.

5–178. *Inspection.* Inspect spark plug as follows:

Caution

No attempt shall be made to disassemble a spark plug during inspection.

a. Inspect for corrosion (rust), stripped or damaged threads, and indications of abuse.

b. Inspect for cracks in shell of spark plug at root of last thread below gasket seat.

c. Inspect electrodes and firing chamber for cleanliness.

d. Inspect shielding barrel insulator for cleanliness, cracks, breaks, and/or other visible defects.

e. Inspect center electrode insulator for cracks, breaks, and/or other visible damage.

f. Inspect electrodes for bends, breaks, peening, erosion, and indications of burning.

g. Inspect for proper gap setting of electrodes.

Note

Massive and fine wire spark plug electrode gap setting is $0.016^{+0.002}_{-0.001}$ inch. Fine wire spark plugs may be regapped to obtain proper gap setting. Massive wire spark plugs with improper gap setting will be replaced with serviceable spark plugs.

5–179. *Installation.* Install spark plugs in each cylinder of engine as follows:

Warning

Spark plugs will not be installed in hot engines, as thread seizure may result, causing possible damage to shell of spark plug and/or spark plug inserts (cylinder).

Caution

Handle spark plugs carefully. A spark plug which has been dropped will not be installed even though visual inspection may indicate that no damage has been done.

a. Remove protector plug from spark plug inserts (cylinder). Check threads of spark plug inserts for cleanliness and damage.

Note

If the threads of the spark plug insert (cylinder) show no indications of cross-threading or other serious damage, clean the threads with a tap, part No. 8003-44A6955, FSN 5136-142-67541. Fill between the flutes of the tap with clean grease (item 21, table 1–8); this will serve to protect the combustion chamber from foreign material. Caution should be exercised to prevent the tap from cross-threading. Screw the tap into the spark plug insert to a depth sufficient to insure that the full tap cutting thread diameter reaches the bottom thread of the spark plug insert. The tap will remove carbon and other combustion deposits from the threads of the spark plug insert. If one application of the tap does not permit the required insertion of the spark plug with the fingers, the cylinder will require replacement. Should the spark plug insert be loose in the cylinder, the threads of the spark plug insert be cross-threaded, or other serious damage be evident, the cylinder must be replaced.

b. Insure that set (eighteen) of spark plugs to be installed in one engine is of same electrode configuration (massive or fine wire) and same type designation.

Caution

If different electrode configurations are used in any one engine installation, the ignition analyzer patterns will differ due to the change in electrical firing impulses.

c. Place new gasket on each spark plug.

d. Apply a light film of thread compound (item 72, table 1–8) to first two threads (nearest to electrodes only) of spark plug. Stir thread compound thoroughly and apply with a suitable brush, not with fingers, as moisture on fingers tends to nullify antiseize effect of thread compound.

Caution

Graphite in thread compound is a conductor of electricity and will not be applied to either ground or center electrodes, as a short will result. Any thread compound which may have been applied to electrodes of a spark plug will be completely removed before the spark plug is installed. In addition, care must be exercised to avoid getting any thread compound on the spark plug gasket or seating surfaces.

Note

If thread compound (item 72, table 1—8) is not available, a similar compound may be made by mixing an equal quantity (by weight) of lubricating oil (item 2, table 1—8) and graphite (item 73, table 1—8) to a smooth paste. When installation of a spark plug is at temperatures below 0°F (-17.8°C), thread compound should be made by mixing an equal quantity (by volume) of lubricating oil (item 74, table 1—8) and graphite (item 73, table 1—8) to a smooth paste and apply lightly to first two threads (nearest to electrodes only) of the spark plug.

e. Insert spark plug in spark plug insert (cylinder) by manually turning spark plug into spark plug insert until spark plug and gasket are seated. After spark plug has been seated manually, tighten spark plug to a torque of 300 to 360 inch-pounds (25 to 30 foot-pounds).

f. Insure that barrel of spark plug is clean and dry, both inside and out.

g. Remove protector from end of each spark plug lead.

h. Insure that spark plug lead connectors are clean. If necessary, clean spark plug lead connectors with a lint-free cloth moistened with naphtha (item 16, table 1—8) or unleaded gasoline (item 64, table 1—8) to remove any trace of dirt or grease that may be present.

Caution

Under no circumstances should leaded gasoline or carbon tetrachloride be used.

Note

Do not touch spark plug connector with fingers.

i. Insure that spring and eyelet assembly and terminal sleeve of each spark plug connector are secured properly and not damaged. Apply a light film of silicone compound (item 50, table 1—8) to each spark plug connector, using a lint-free cloth.

Warning

Silicone compound contains minutely ground silica and mica which are irritating to the eyes and skin. Gloves should be worn when silicone compound is frequently handled.

j. Insert spark plug connector into barrel of spark plug without touching spring and eyelet assembly, and terminal sleeve. (See figure 5—73.)

Caution

To prevent damage to terminal sleeve or shielding barrel insulator, spark plug lead connector must be inserted straight into barrel of spark plug and not cocked.

k. Tighten coupling nut of spark plug lead finger-tight. Hold spark plug lead in proper position and tighten coupling nut 15 degrees more with a suitable crowfoot wrench.

Caution

Never use an open end wrench, as damage to the shielding barrel insulator may result from side loading. Hold the spark plug lead with one hand while tightening the coupling nut.

Section VIII Cooling System

5—180. Description. The cooling system consists of a contravane assembly, cooling panel assembly, accessory compartment cover assembly, accessory section and engine mount cooling tubes, and engine cooling fan assembly. (See figure 5—76.)

5—181. Contravane Assembly. The contravane assembly is installed on the crankcase front section of the engine, and supports the forward edge of the cooling panel assembly (five cowl panels). The contravane assembly encloses the hydromechanical clutch and fan, thereby directing the flow of cooling air from the fan. Vanes inside the contravane assembly straighten the flow of air from the fan to reduce turbulence of air inside the cooling panel assembly. The contravane assembly is constructed of aluminum on helicopters serial No. prior to 57-1755. On helicopters serial No. 57-1755 and subsequent, the contravane assembly is constructed of reinforced plastic. (See figures 5—76 and 5—77.)

5—182. Inspection. a. Gain access to contravane assembly as follows:

(1) Open nose doors.

(2) Remove cold air elbow duct and air filter assembly as outlined in paragraphs 5—46 and 5—51.

(3) Remove cooling panel assembly as outlined in paragraph 5—184.

b. Inspect contravane assembly for security of attachment.

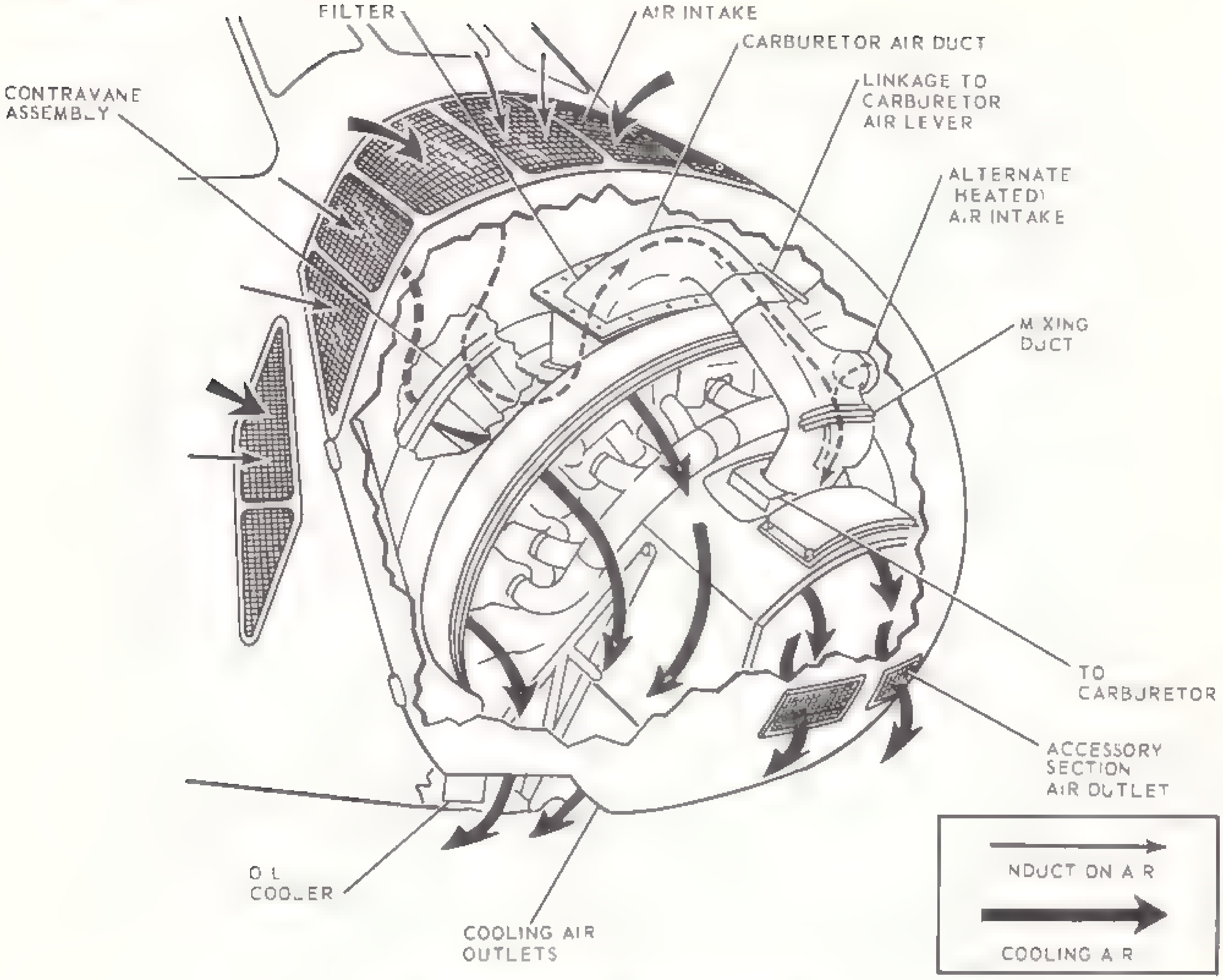


Figure 5—76. Engine cooling system schematic diagram

c. Check clearance between tip of fan blades and contravane assembly. Clearance should be 0.050 to 0.103 inch.

d. Inspect plastic contravane assembly for cracks, breaks, gouges, erosion, punctures, and heat damage.

e. Inspect aluminum contravane assembly as follows:

(1) Inspect for cracks on inner ring radius of each vane. (See figure 5—78.)

Note

Use an extension-type inspection mirror and a flashlight. If necessary, a more detailed inspection of the lower vanes may be performed by lowering the engine. (Notify direct support maintenance unit.)

(2) Inspect each vane at both tabs for loose or sheared rivets on inner ring radius of each vane. (See figure 5—78.)

f. After inspection is completed, accomplish the following:

(1) Install cooling panel assembly. (Refer to paragraph 5—187.)

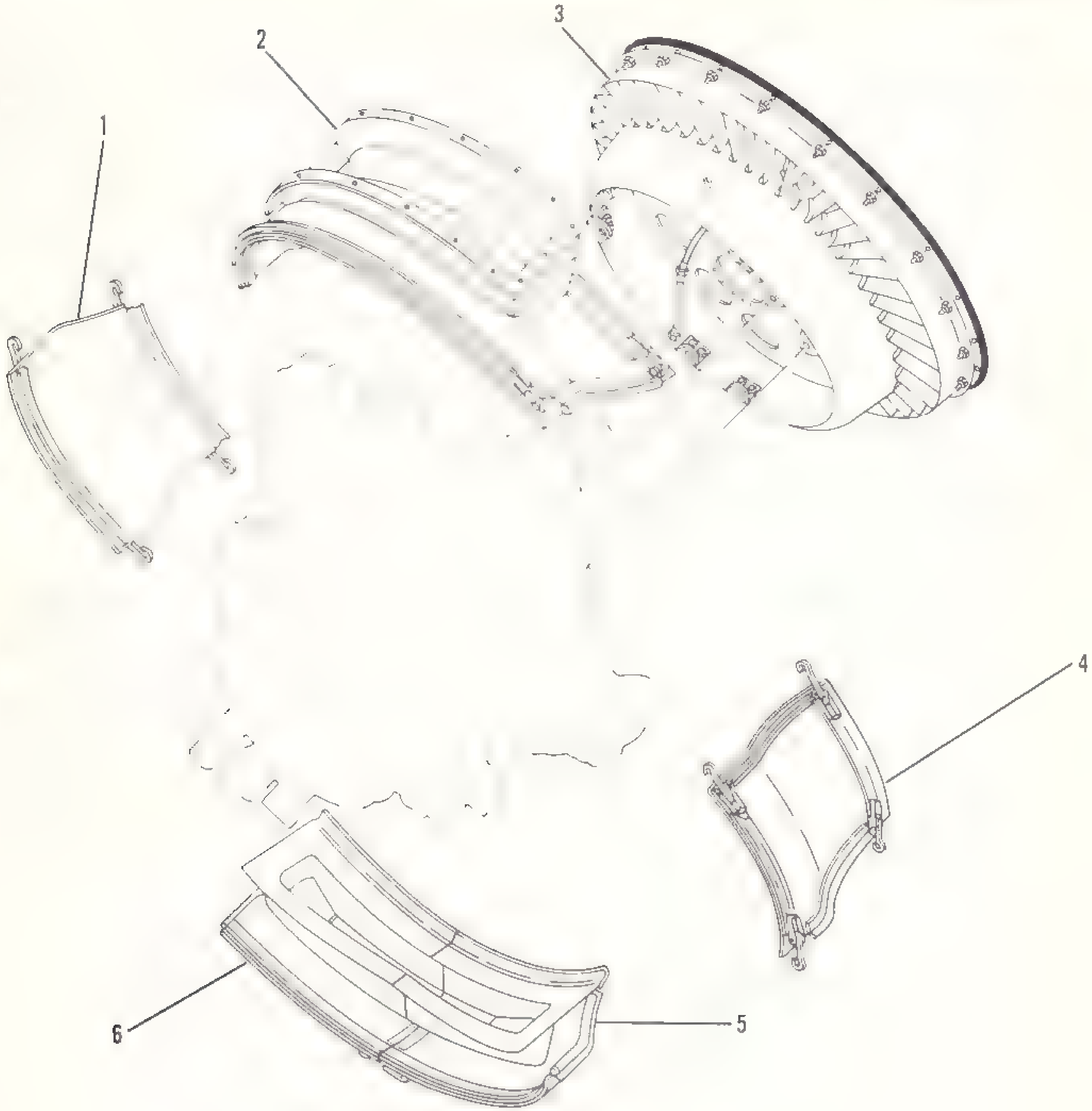
(2) Install cold air elbow duct and air filter assembly. (Refer to paragraphs 5—49 and 5—55.)

(3) Close nose doors.

5—183. Cooling Panel Assembly. The cooling panel assembly consists of five cowl panels (1, 2, 4, 5, and 6, figure 5—77). The cooling panel assembly directs the airflow produced by the fan to a specific area. The forward edge of the cooling panel assembly is supported by the contravane assembly, and the aft edge is supported by cowl seal channels on the engine.

5—184. Removal. a. Open nose doors.

b. Remove cold air elbow duct and air filter assembly as outlined in paragraphs 5—46 and 5—51.



1. Cowl panel
2. Cowl panel
3. Contravane assembly
4. Cowl panel
5. Cowl panel
6. Cowl panel

Figure 5—77. Contravane assembly and cooling panel assembly

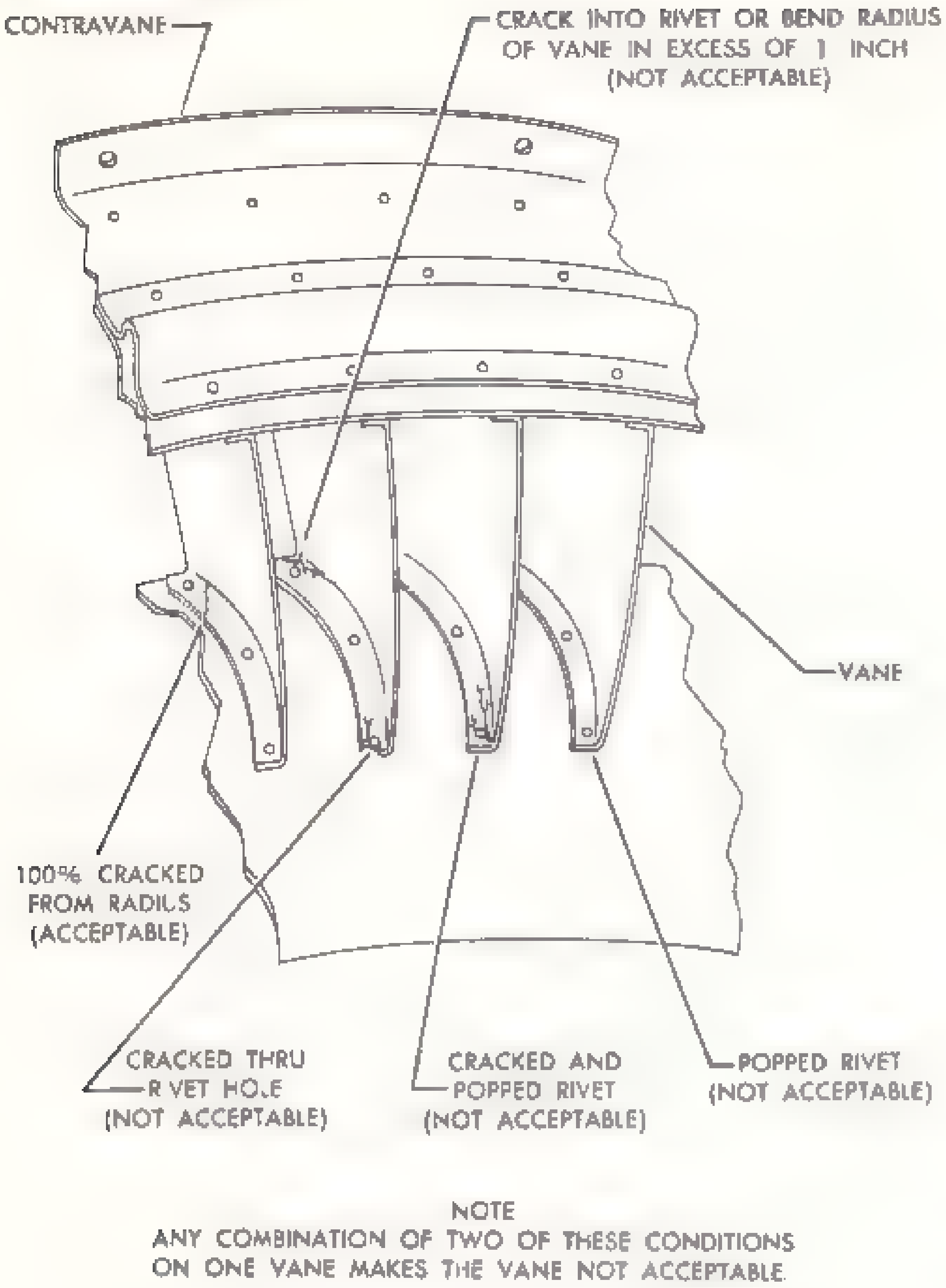


Figure 5–78. Inspection of contravane assembly vanes

c. Unfasten latches securing cowl panels (1 and 4, figure 5–77) to cowl panels (2, 5, and 6).

d. Lower cowl panels (5 and 6) and remove cowl panels (1 and 4).

e. Unfasten latches securing cowl panels (5 and 6) together. Remove cowl panel (5) only.

Note

Cowl panel (6) cannot be removed unless power package is hinged down or removed from helicopter.

f. Remove cowl panel (2) from top of engine.

5–185. Cleaning. Clean cowl panels of cooling panel assembly, using solvent (item 4, table 1–8). Dry thoroughly with a clean, dry cloth.

5–186. Inspection. a. Inspect cowl panels for cracks, breaks, defective welds, corrosion, and security of rivets.

b. Inspect cowl panels for damaged latches and hooks. Check for security of attachment.

c. Inspect seals under each cowl panel for security of attachment and deterioration or damage.

5–187. Installation. Install cowl panel assembly as follows:

Note

Cowl panel (6, figure 5–77) must be installed before power package is hinged up or before power package is installed. (Notify direct support maintenance unit.)

a. Align reference mark on cowl panel (2) with reference mark on head of contravane assembly (3), and position cowl panel on engine.

b. Position cowl panel (5) on engine and secure to cowl panel (6) with latches.

c. Position cowl panel (1) on engine, and secure to cowl panels (2 and 6) with latches.

d. Position cowl panel (4) on engine and secure to cowl panels (2 and 5) with latches.

e. Adjust nuts on latches of cowl panels (1 and 4) to obtain a tight fit between seals of cowl panels and cylinder heads.

f. Install cold air elbow duct and air filter assembly. (Refer to paragraphs 5–49 and 5–55.)

g. Close nose doors.

5–188. Accessory Compartment Cover Assembly. The accessory compartment cover assembly consists of shroud panels (1, 2, and 3, figure 5–79). The accessory compartment cover assembly directs the cooling air around the components installed on the engine accessory section.

5–189. Removal. a. Open nose door to gain access to engine.

b. Remove shroud panel (1, figure 5–79) as follows:

(1) Remove cover from terminal block on top of shroud panel (1) and disconnect carburetor air temperature bulb electrical wires.

(2) Pull lower electrical wires (carburetor air temperature bulb) down into accessory section. Remove terminal block and grommet from shroud panel (1).

(3) Release fasteners securing shroud panel (1). Pull shroud panel from beneath well assembly.

c. Remove screws securing shroud panel (2). Remove shroud panel.

d. Remove shroud panel (3) as follows:

(1) Disconnect hose assemblies from quick disconnects at each side of shroud panel (2). Install protective caps on fittings of quick disconnects and install protective plugs into end of each hose assembly.

(2) Drain oil tank into a suitable container at drain valve just forward of oil cooler.

(3) Disconnect inlet and outlet hose assemblies from oil pump fitting by removing nuts and washers. Drain inlet and outlet hose assemblies into a suitable container.

(4) Remove gaskets from oil pump fittings and discard. Install protective covers on oil pump fittings and on end of inlet and outlet hose assemblies.

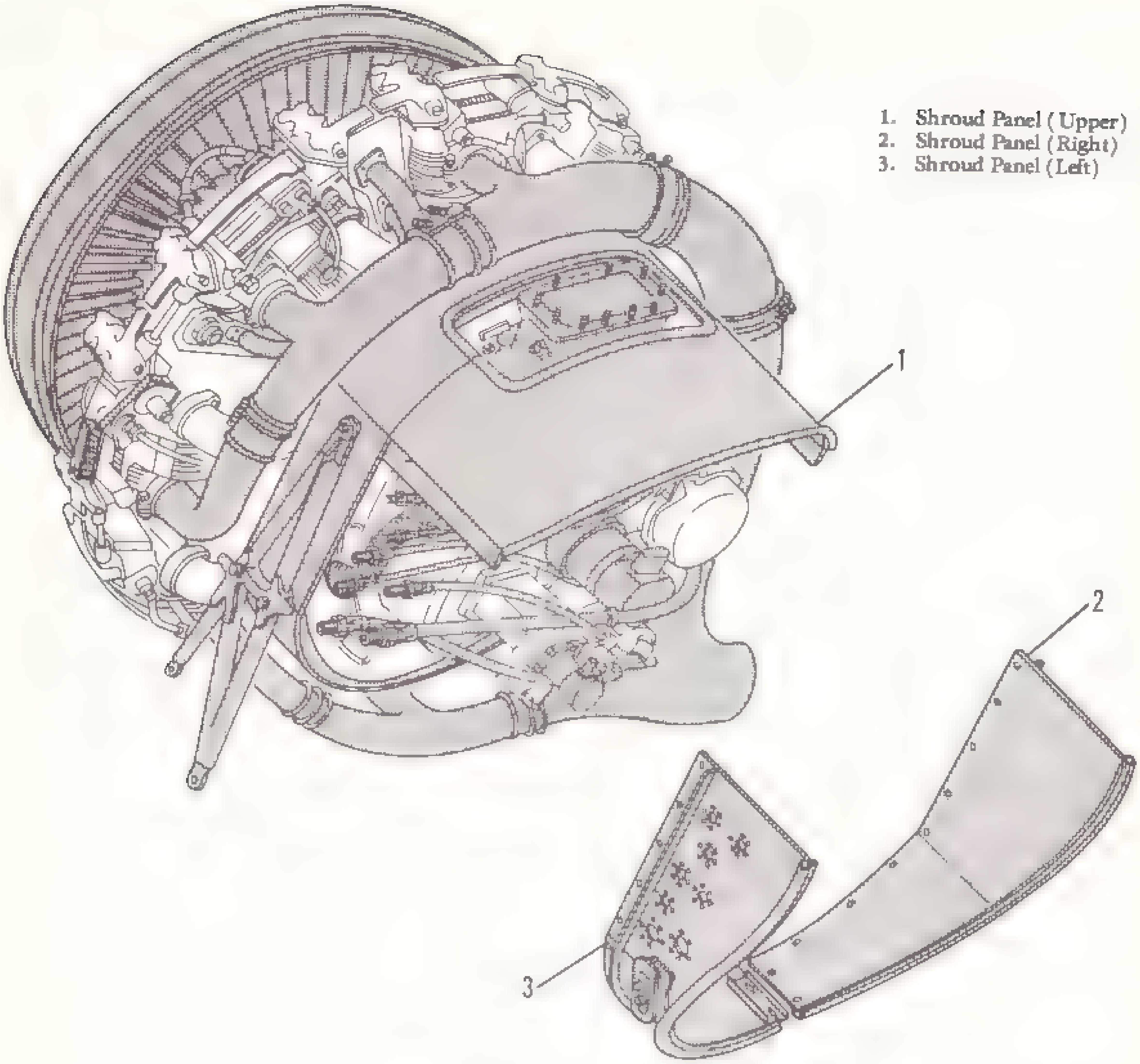


Figure 5–79. Accessory compartment cover assembly

(5) Remove screws securing retainer to shroud panel (3) at opening where inlet and outlet hose assemblies pass through shroud panel. Slide retainer and half-slides away from shroud panel.

(6) Remove screws securing shroud panel (3). Pull shroud panel free of inlet and outlet hose assemblies.

(7) Remove screws securing half-slides together and remove half-slides and retainers from inlet and outlet hose assemblies.

Note

To maintain a complete shroud panel (3), install half-slides and retainer on shroud panel.

(8) Remove tee fitting and nut from carburetor return line quick disconnect. Remove each quick disconnect from shroud panel (3).

5–190. Cleaning. Clean accessory compartment cover assembly with solvent (item 4, table 1–8). Dry thoroughly with a clean, dry cloth.

5–191. Inspection. Inspect accessory compartment cover assembly for cracks, breaks, distortion, corrosion, elongated holes, loose or missing rivets, and seal damage.

5–192. Installation. a. Position shroud panel (2, figure 5–79) in place and secure with screws.

b. Install shroud panel (3) as follows:

(1) Install quick disconnects in shroud panel (3). Install tee fitting in inboard side of carburetor vapor return line quick disconnect and secure with nut.

(2) Slide retainer onto inlet and outlet hose assembly. Position two half-slides around inlet and outlet hose assemblies and secure together with screws.

(3) Position shroud panel (3) in place; at same time, work end of each inlet and outlet hose assembly through opening in shroud panel. Secure shroud panel in place with screws.

(4) Secure shroud panel (3) to shroud panel (2) with screws.

(5) Position half-slides and retainer against shroud panel (3). Secure retainer to shroud panel with screws.

(6) Remove protective covers from oil pump fitting and ends of inlet and outlet hose assemblies.

(7) Install new gaskets on oil pump fittings. Connect inlet and outlet hose assemblies to oil pump fittings and secure with nuts and washers.

(8) Connect hose assemblies to proper quick disconnects at each side of shroud panel (3).

Caution

Insure that each hose assembly is attached to correct quick disconnect.

c. Install shroud panel (1) as follows:

(1) Position shroud panel (1) in place under well assembly and secure with fasteners.

(2) Install terminal block on top of shroud panel (1).

(3) Draw lower electrical wires (carburetor air temperature bulb) up through hole in shroud panel (1). Install grommet in hole around electrical wires.

(4) Connect upper and lower electrical wires (carburetor air temperature bulb) to proper terminals on terminal block. Install cover on terminal block.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

d. Service oil tanks. (Refer to tables 1–5 and 1–6.)

e. Preoil engine as outlined in paragraph 5–7.

f. Close nose doors.

5–193. Accessory Section and Engine Mount Cooling Tubes. Six engine mount and two magneto cooling tubes are installed on the engine to provide cooling ram air to the accessory section and engine mounts. The cooling tubes are made of stainless steel. Each tube is bolted to an engine intercylinder deflector at the forward end and is routed aft to the fire seal. Five engine mount cooling tubes (type A, table 5–5) are secured with collars to flanges on the fire seal. The sixth engine mount cooling tube (type C, table 5–5) extends through an asbestos seal under the bead on the aft side of the fire seal. A flexible magneto cooling tube (3, figure 5–63), clamped to the magneto cooling tube (type B, table 5–5) which extends through an asbestos seal at 12 o'clock position in the fire seal, ends directly above the magneto and is clamped to the upper right part of the engine mount ring and to the fuel inlet line between the fuel pump and the carburetor. The flexible magneto cooling tube (1, figure 5–63) on the other magneto cooling tube (type B, table 5–5) is clamped to brackets on the hydraulic pump and oil strainer pad mounting studs. Cooling ram air from this cooling tube blows across the accessory section to the magneto. (See figure 5–80.)

Note

Directional references are given as viewed from accessory section of the engine.

5–194. Removal. a. Open nose doors.

b. Remove cowl panels as necessary to gain access to cooling tubes. (Refer to paragraph 5–184.)

c. Remove upper shroud panel. (Refer to paragraph 5–189.)

d. Remove exhaust collectors as necessary to gain access to cooling tubes. (Refer to paragraph 5–63.)

e. Unclamp flexible magneto cooling tube (3, figure 5–63) from engine mount ring and fuel inlet line.

f. Unclamp flexible magneto cooling tube (1) from brackets secured to hydraulic pump and oil strainer mounting pad.

g. Remove flexible magneto cooling tubes (1 and 3) from magneto cooling tubes (type B, table 5–5). (See figure 5–80.)

h. Remove screws, washers, and nuts securing flange on forward end of engine mount cooling tube (type C,

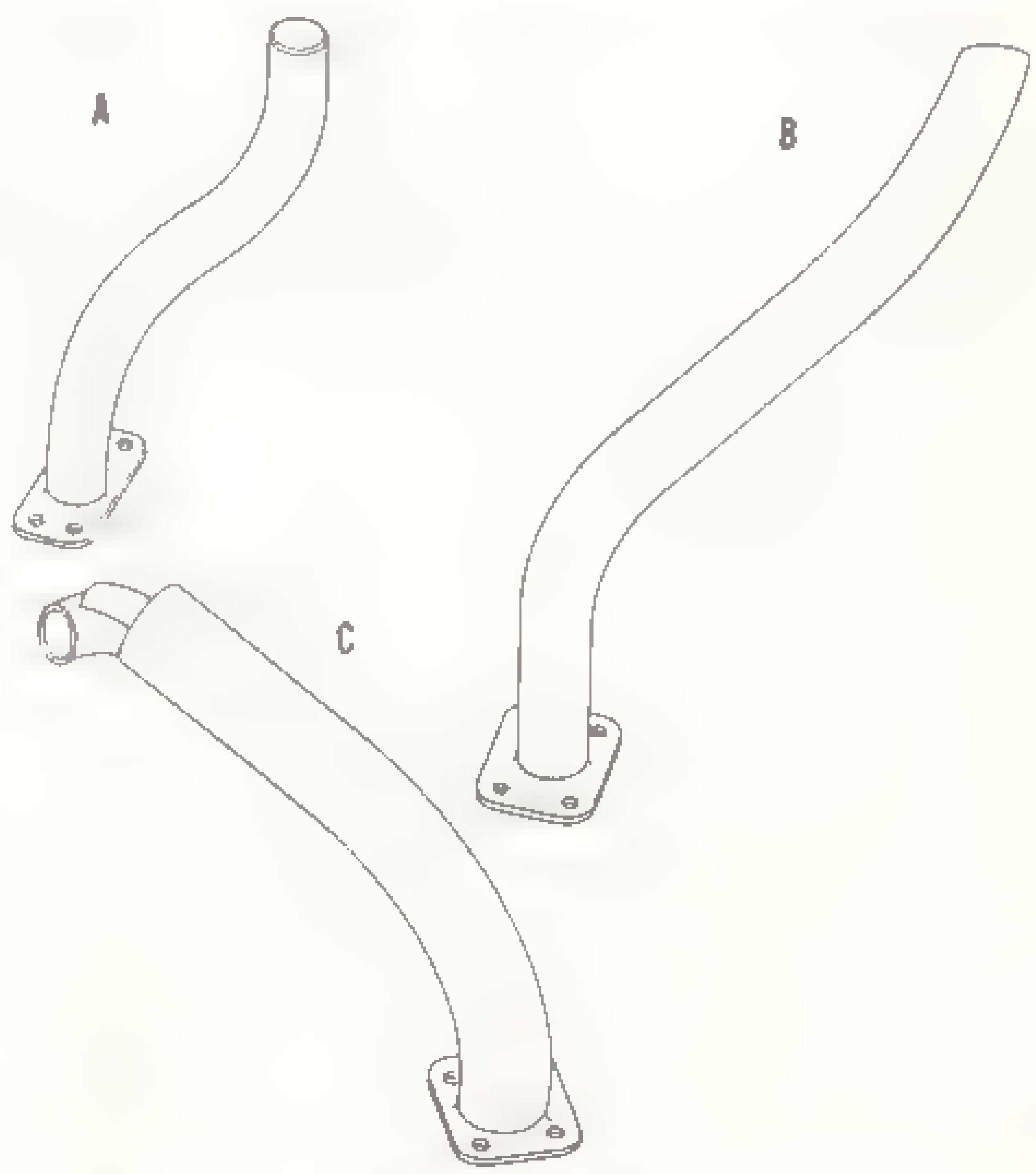


Figure 5–80. Accessory section and engine mount cooling tubes (rigid types)

Table 5–5. Cooling tube installation

TUBE TYPE (See figure 5–80)	FROM INTERCYLINDER DEFLECTOR BETWEEN CYLINDERS NO.	TO FIRE SEAL POSITION	SPECIAL ROUTING	TYPE CONNECTION ON FIRE SEAL
A	2 and 3	1 o'clock		Flange
A	3 and 4	3 o'clock	Inboard hole of intercylinder deflector	Flange
C	3 and 4	4 o'clock	Outboard hole of intercylinder deflector; through fire seal and under bead on aft side	Asbestos Seal
A	6 and 7	7 o'clock	Inboard hole of intercylinder deflector	Flange
B	6 and 7	8 o'clock	Outboard hole of intercylinder deflector; flexible tube attached at aft side of fire seal	Asbestos Seal
A	8 and 9	9 o'clock		Flange
A	9 and 1	11 o'clock	Inboard hole of intercylinder deflector	Flange
B	9 and 1	12 o'clock	Outboard hole of intercylinder deflector; flexible tube attached at aft side of fire seal	Asbestos Seal

table 5–5) to intercylinder deflector. Remove engine mount cooling tube by working aft end of cooling tube from beneath bead on fire seal and through asbestos seal. (See figure 5–80.)

i. Remove engine mount cooling tubes (type A, table 5–5) as follows: (See figure 5–80.)

(1) Remove bolts and washers securing collar to each flange on forward side of fire seal, and slide collar onto each engine mount cooling tube.

(2) Remove screws, washers, and nuts securing flanges on forward end of each engine mount cooling tube. Remove engine mount cooling tube.

5–195. Cleaning. Clean engine mount and magneto cooling tubes with solvent (item 4, table 1–8).

5–196. Inspection. a. Inspect engine mount and magneto cooling tubes (rigid) for cracks, corrosion, distortion, holes, and punctures.

b. Inspect flexible magneto cooling tubes for holes, deterioration, fraying, and punctures.

5–197. Installation. a. Install engine mount cooling tubes (type A, table 5–5) as follows: (See figure 5–80.)

(1) Slide a collar over aft end of each engine mount cooling tube, making sure that mating surface of collar faces toward fire seal. Secure flange on forward end of each engine mount cooling tube to proper intercylinder deflector with screws, washers, and nuts. (Refer to table 5–5 for proper location and positioning of engine mount cooling tubes.)

Note

Each of these five engine mount cooling tubes passes between an intake pipe and a cylinder, and is secured to an inboard hole in the intercylinder deflector.

(2) Secure collars on aft ends of each engine mount cooling tube to flanges on forward side of fire seal with bolts and washers.

b. Insert aft ends of two magneto cooling tubes (type B, table 5–5) into asbestos seals at 8 and 12 o'clock positions on fire seal. Secure forward ends of each magneto cooling tube to proper intercylinder deflector with screws, washers, and nuts. (See figure 5–80.) (Refer to table 5–5 for proper location and positioning of magneto cooling tubes.)

Caution

Care should be exercised when inserting magneto cooling tubes through asbestos seals to prevent damage to seals.

c. Clamp flexible magneto cooling tube (1, figure 5–63) to aft end of magneto cooling tube (type B, table 5–5) extending through fire seal at 8 o'clock position.

d. Clamp flexible magneto cooling tube (3, figure 5–63) to aft end of magneto cooling tube (type B, table 5–5) extending through fire seal at 12 o'clock position.

e. Clamp flexible magneto cooling tube (3, figure 5–63) to upper right part of engine mount ring and fuel intake line between fuel pump and carburetor so that open end is directly above magneto.

f. Clamp flexible magneto cooling tube (1) to brackets on hydraulic pump and oil strainer pad mounting studs, making sure that open end faces toward magneto.

g. Work aft end of remaining engine mount cooling tube (type C, table 5–5) through asbestos seal at 4 o'clock position on fire seal and under bead on aft side of fire seal. Secure forward end of engine mount cooling tube to outboard hole of intercylinder deflector between cylinders No. 3 and 4 with screws, washers, and nuts.

h. Install exhaust collectors as necessary. (Refer to paragraph 5–66.)

i. Install upper shroud panel. (Refer to paragraph 5–192.)

j. Install cowl panels as necessary. (Refer to paragraph 5–187.)

k. Close nose doors.

5–198. Engine Cooling Fan Assembly. The engine cooling fan assembly is splined to the propeller shaft of the engine and is secured in place by an engine shaft nut. The engine shaft nut is secured in place by a lockpin assembly. The engine cooling fan assembly furnishes cooling ram air to cool the engine and accessories, and provides ram air for the air induction system.

5–199. Inspection. a. Inspect engine cooling fan assembly for security of attachment, cracks, corrosion, and loose or damaged hardware.

b. Inspect blades of engine cooling fan assembly for erosion, cracks, breaks, nicks, gouges, corrosion pitting, and security of attachment.

c. Check hydro-mechanical clutch for security of attachment.

Section IX Carburetors

5–200. Carburetor. The PD-12R1 injection carburetor, mounted on a studded pad on top of the supercharger rear housing, is a double-barrel, downdraft unit employing a proven method of metering fuel through fixed jets in proportion to mass airflow. This mass airflow is controlled, measured, and converted into a working force to supply fuel. Thus, any increase in airflow provides an automatic increase in fuel. By sensing changes in air pressure and temperature, automatic adjustment of air metering force provides accurate fuel metering during all conditions of engine operation. With the fuel discharge nozzle located downstream from the throttle valves, ice formation caused by fuel evaporation within the carburetor is eliminated and positive fuel metering during all maneuvers is assured. The carburetor provides a manual means for selecting fuel requirements of the engine for all operating conditions, regardless of engine speed, engine load, or throttle positions. The carburetor incorporates an inlet fuel strainer assembly and a primer system controlled by a primer solenoid valve. On helicopters serial No. prior to 54-2862, the primer solenoid valve is actuated by the ENG PRM OFF OIL DIL switch on the main switch panel in the pilots' compartment. On helicopters serial No. 54-2862 and subsequent, the primer solenoid valve is actuated by a switch marked ENG. PRI., located on the pilot's side of the radio console.

5–201. Removal. a. Place BATT and GEN switches in OFF position.

b. Shut off fuel supply to engine.

c. Remove air intake duct as outlined in paragraph 5–57, steps *a* through *l*.

d. Remove lock wire and disconnect electrical plug (12, figure 5–81) from primer solenoid valve (4).

e. Disconnect fuel inlet line (8) from fuel inlet elbow (7). Install protector plug in fuel inlet line, and install protector cap on fuel inlet elbow.

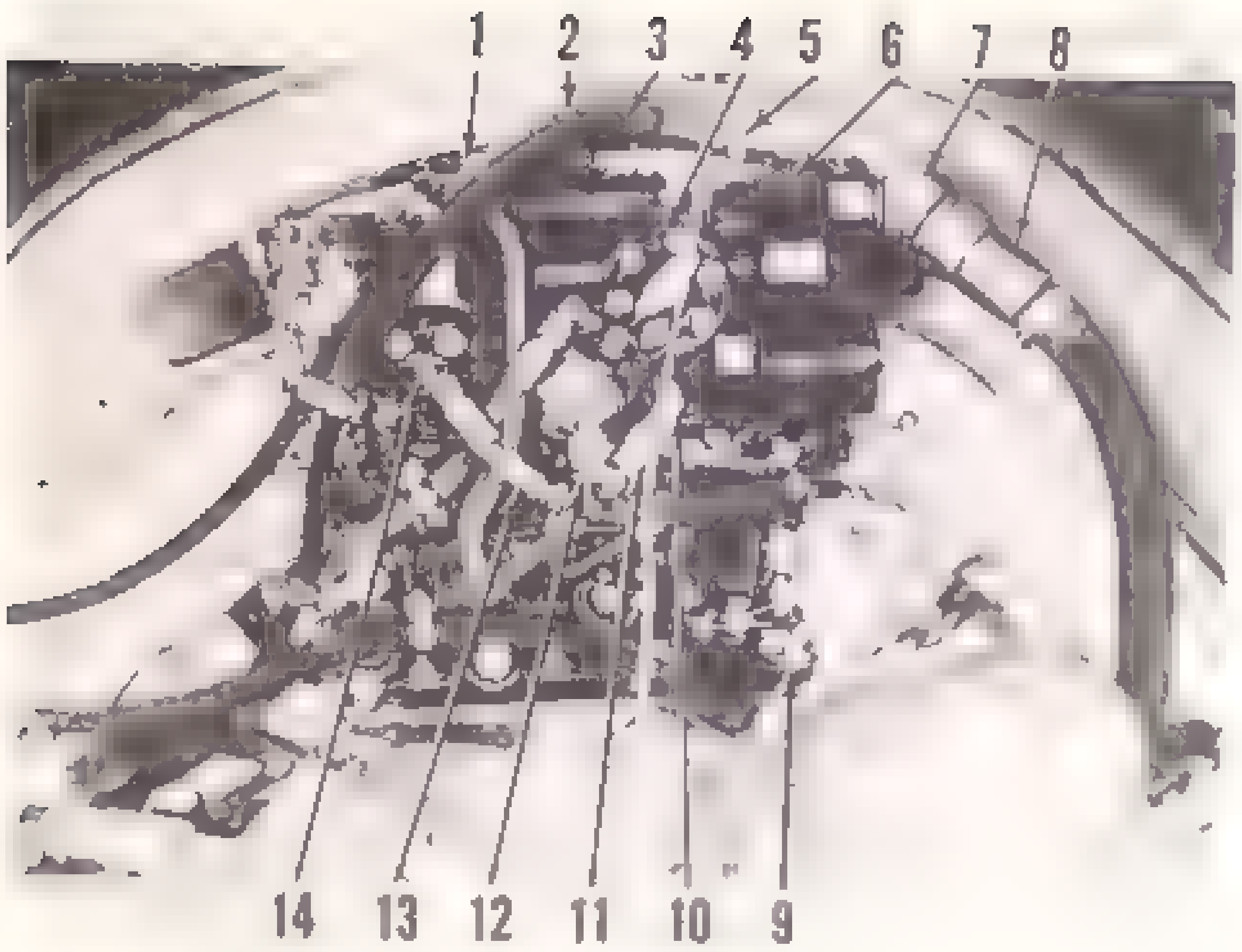
f. Disconnect vapor return lines (1 and 3) from vapor return elbows (2 and 5). Install protector plugs in vapor return lines, and install protector caps on vapor return elbows.

g. Disconnect fuel pressure line (11) from fuel pressure restrictor (10). Install protector plug in fuel pressure line, and install protector cap in fuel pressure restrictor.

h. Remove clamps securing vapor return line (3) and fuel pressure line (11) to primer line.

Note

The primer line is installed between the primer solenoid valve (4) and the fitting on the lower left side of the carburetor.



1. Vapor Return Line
2. Vapor Return Elbow
3. Vapor Return Line
4. Primer Solenoid Valve
5. Vapor Return Elbow
6. Carburetor
7. Fuel Inlet Elbow
8. Fuel Inlet Line
9. Nut, Washer
10. Fuel Pressure Restrictor
11. Fuel Pressure Line
12. Electrical Plug
13. Altitude Compensator Vent Line
14. Altitude Compensator Elbow

Figure 5–81. Carburetor installation

i. Check air inlet screen on top of carburetor and area around base of carburetor for foreign material such as lock wire, hardware, and dirt.

Warning

The area around the carburetor shall be free of all foreign material before the carburetor is removed, to prevent entry of the foreign material into the supercharger section.

j. Remove nuts and washers (9) securing carburetor (6) to engine and lift carburetor off carburetor port of engine.

k. Remove gasket from carburetor port of engine and install protective cover over carburetor port.

l. Remove gaskets and air inlet screen from top of carburetor.

5–202. Cleaning. Clean external surfaces of carburetor with solvent (item 4, table 1–8).

5–203. Inspection. a. Inspect carburetor for cracks, particularly at mounting flanges.

b. Inspect tapped holes on carburetor deck for stripped or damaged threads.

c. Inspect carburetor for indications of leaks, corrosion, loose or damaged components, and distorted mounting flanges.

d. Inspect fuel line connections and nuts for security of attachment.

e. Inspect plugs, screws, and lock wire for security of attachment.

f. Inspect carburetor linkage for damage and security of attachment.

g. Check throttle valves for looseness, binding, and security of attachment.

h. Check throttle and manual mixture controls for binding, proper operation, and security of attachment.

5–204. Installation. a. If a new or overhauled carburetor (6, figure 5–81) is to be installed, depreserve carburetor by draining corrosion-preventive oil and allowing gasoline to flow through carburetor until the oil is expelled. Allow gasoline to remain in carburetor for a minimum of 8 hours prior to any engine operation.

Caution

Never, under any circumstances, allow the same gasoline to remain in a carburetor for a period exceeding 10 days, as a chemical reaction will take place between the gasoline and the diaphragms, resulting in diaphragm failure.

b. Position gasket, air inlet screen, and a second gasket on top flange of carburetor (6).

c. Check area around protective cover on carburetor port of engine for foreign material.

Warning

The area around the carburetor port shall be free of foreign material before the protective cover is removed, to prevent entry of the foreign material into the supercharger section.

d. Remove protective cover from carburetor port of engine. Check impeller chamber of supercharger section to insure that no foreign material is present.

e. Position new gasket on carburetor mounting pad of engine.

Note

Insure that surfaces of mounting pad are clean and free of dents, abrasions, and marks.

f. Position carburetor over carburetor port onto mounting pad of engine and secure with washers and nuts (9). Tighten nuts to a torque of 275 to 300 inch-pounds, using wrench, part No. 809780, FSN 5120-674-0347, and wrench, part No. 809781, FSN 5120-674-0346.

Caution

After the carburetor is installed on the engine, insure that the carburetor is filled with gasoline and allowed to stand for at least 8 hours prior to any engine operation.

Note

Tilt carburetor toward rear to install washers and nuts (9) on studs located at forward corners of mounting flange.

g. Remove protector cap from fuel inlet elbow (7) and remove protector plug from fuel inlet line (8). Connect fuel inlet line to fuel inlet elbow and tighten securely.

h. Remove protector cap from fuel pressure restrictor (10) and remove protector plug from fuel pressure line (11). Connect fuel pressure line to fuel pressure restrictor and tighten securely.

i. Remove protector cap from vapor return elbows (2 and 5) and remove protector plugs from vapor return lines (1 and 3). Connect vapor return lines to vapor return elbows and tighten securely.

j. Secure vapor return line (3) and fuel pressure line (11) to primer line with clamps.

k. Connect electrical plug (12) to primer solenoid valve and secure with lock wire.

l. Install air intake duct. (Refer to paragraph 5–60.)

m. Perform pressure check on carburetor and check for fuel leaks.

n. Close nose doors.

5–205. Adjustment. a. Idle mixture check. Check idle mixture adjustment as follows:

Note

While making idle mixture check, be sure cylinder head temperature is at least 150°C (302°F). If cylinder head temperature tends to be below this, operate engine at 25 inches Hg manifold pressure at 2400 rpm for a short duration.

(1) Start engine in accordance with TM 55-1520-202-10.

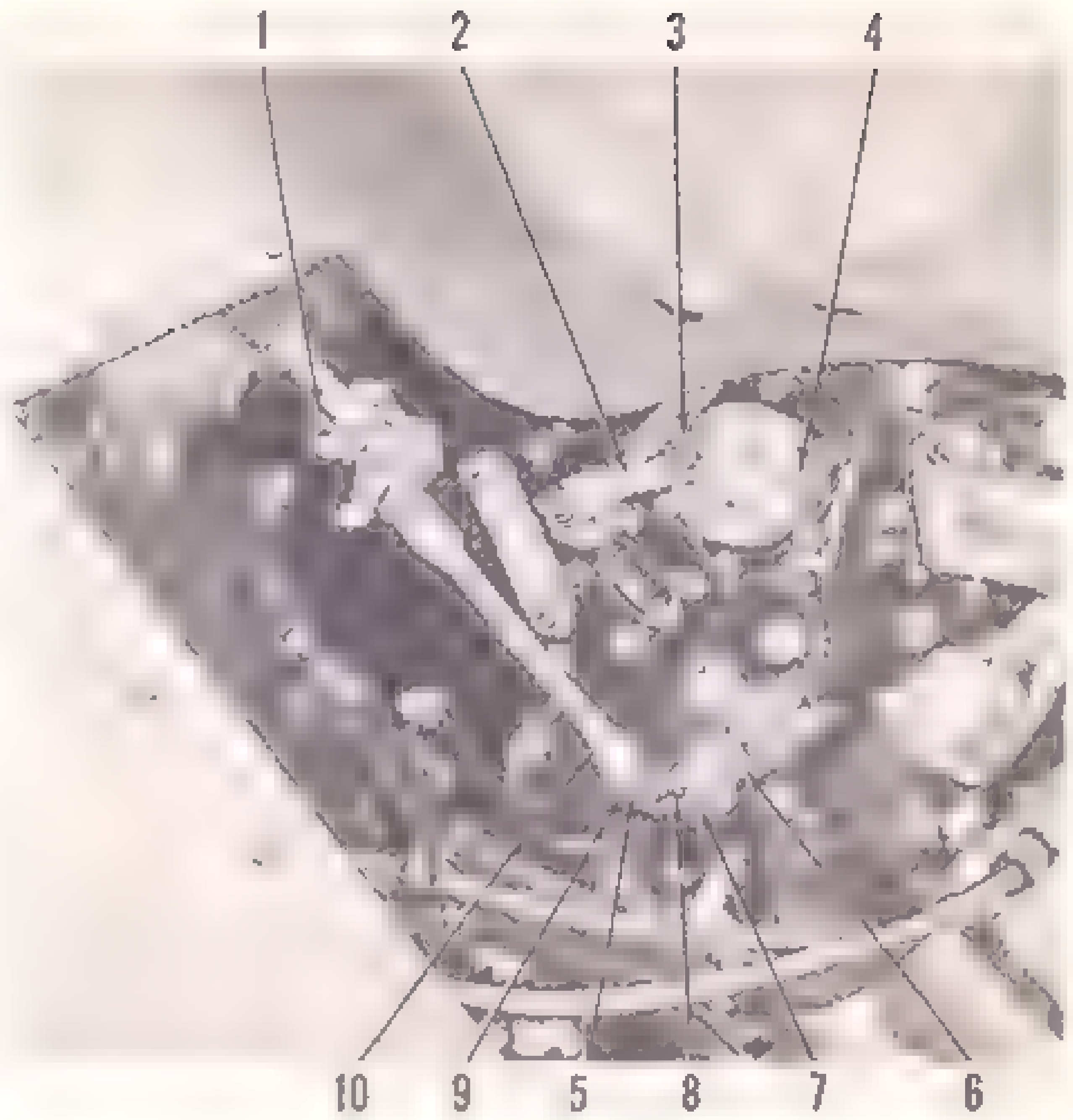
Warning

Engine operation will be performed by authorized personnel only.

(2) Adjust throttle stop (1, figure 5–82) so that, with clutch disengaged, mixture control lever in RICH position, and pilot's throttle control closed, engine will idle at 900 to 1100 rpm.

(3) Lock pilot's throttle control in CLOSED position.

(4) Depress primer switch momentarily and note any change in manifold pressure and rpm. A momentary decrease in manifold pressure accompanied by



1. Throttle Stop
2. Mixture Control Lever
3. Castle Nut
4. Mixture Control Latch Cover
5. Idle Link Bolt
6. Adjusting Idle Indicator
7. Idle Mixture Adjustment Lockscrew
8. Idle Adjusting Screw
9. Castle Nut
10. Idle Link

Figure 5–82. Engine control rods at carburetor

corresponding increase in rpm indicates that mixture is too lean. If idle mixture is either correct (at best power) or too rich, a momentary decrease in rpm and increase in manifold pressure will occur when primer is energized. To determine if mixture is too rich or at best power, proceed to step (5) below.

(5) Slowly move mixture control toward CUT-OFF position. Note any change in manifold pressure and rpm during this procedure. A momentary decrease in manifold pressure with an increase in rpm indicates that mixture is too rich. If a decrease in rpm and an increase in manifold pressure occurs, then mixture is at best power setting.

(6) Stop engine in accordance with TM 55-1520-202-10.

b. Idle mixture adjustment (below 1100 rpm). (1) Accomplish procedures outlined in paragraph *a*, steps (1) through (3) above.

Note

Cylinder head temperature must be at least 150°C (302°F) before the following adjustments are made.

(2) Remove lock wire and loosen idle mixture adjustment lockscrew (7, figure 5–82).

(3) Turn adjusting idle indicator (6) one notch at a time until lowest manifold pressure and highest rpm are obtained.

Note

Turn adjusting idle indicator in a clockwise direction to enrich mixture, counterclockwise to lean mixture.

(4) Readjust idle speed at 1100 rpm at throttle stop (1).

(5) Again turn adjusting idle indicator (6) until lowest manifold pressure and highest rpm are obtained.

Caution

Engine idle speed, in actual helicopter operating conditions, above 1100 rpm can result in clutch engagement difficulties and is to be avoided.

(6) Tighten idle mixture adjustment lockscrew (7). Reset idle speed to 1100 rpm at throttle stop (1).

(7) Check to insure that cylinder head temperature is at least 150°C (302°F). Secure idle mixture adjustment lockscrew (7) with lock wire.

(8) With pilot's throttle in CLOSED position, readjust throttle stop (1) to minimum idle speed.

c. Mixture control adjustment (above 1100 rpm). If shifting mixture control lever on engine control quadrant to RICH, NORMAL, or IDLE CUT-OFF positions does not achieve desired fuel-air ratio in carburetor, adjust as follows:

(1) Remove cotter pin and loosen castle nut (3, figure 5–82).

(2) Reposition mixture control lever (2) on mixture control latch cover (4) so that when mixture control lever on engine control quadrant (pilots' compartment) is in either RICH, NORMAL, or IDLE CUT-OFF position, under actual engine operating conditions, mixture control latch cover (at carburetor) will register RICH, NORMAL, or IDLE CUT-OFF respectively; also, protrusion on mixture control latch cover (at carburetor) will be positioned to correspond relatively from protrusion on mixture control cover (on pilot's engine control quadrant).

(3) Tighten castle nut (3) and secure with cotter pin.

d. Adjustment of idle mixture linkage to shift idle mixture adjustment range. (1) When adjusting idle indicator (6, figure 5–82) has insufficient travel to obtain correct idle mixture, disconnect idle link (10) from eye of idle adjusting screw (8) by removing cotter pin and idle link bolt (5). (See figure 5–83.)

(2) If a leaner mixture is required, screw eye of idle adjusting screw (8, figure 5–82) into threaded idle adjusting bushing. If a richer mixture is required, screw eye of idle adjusting screw out of idle adjusting bushing. (See figure 5–83.)

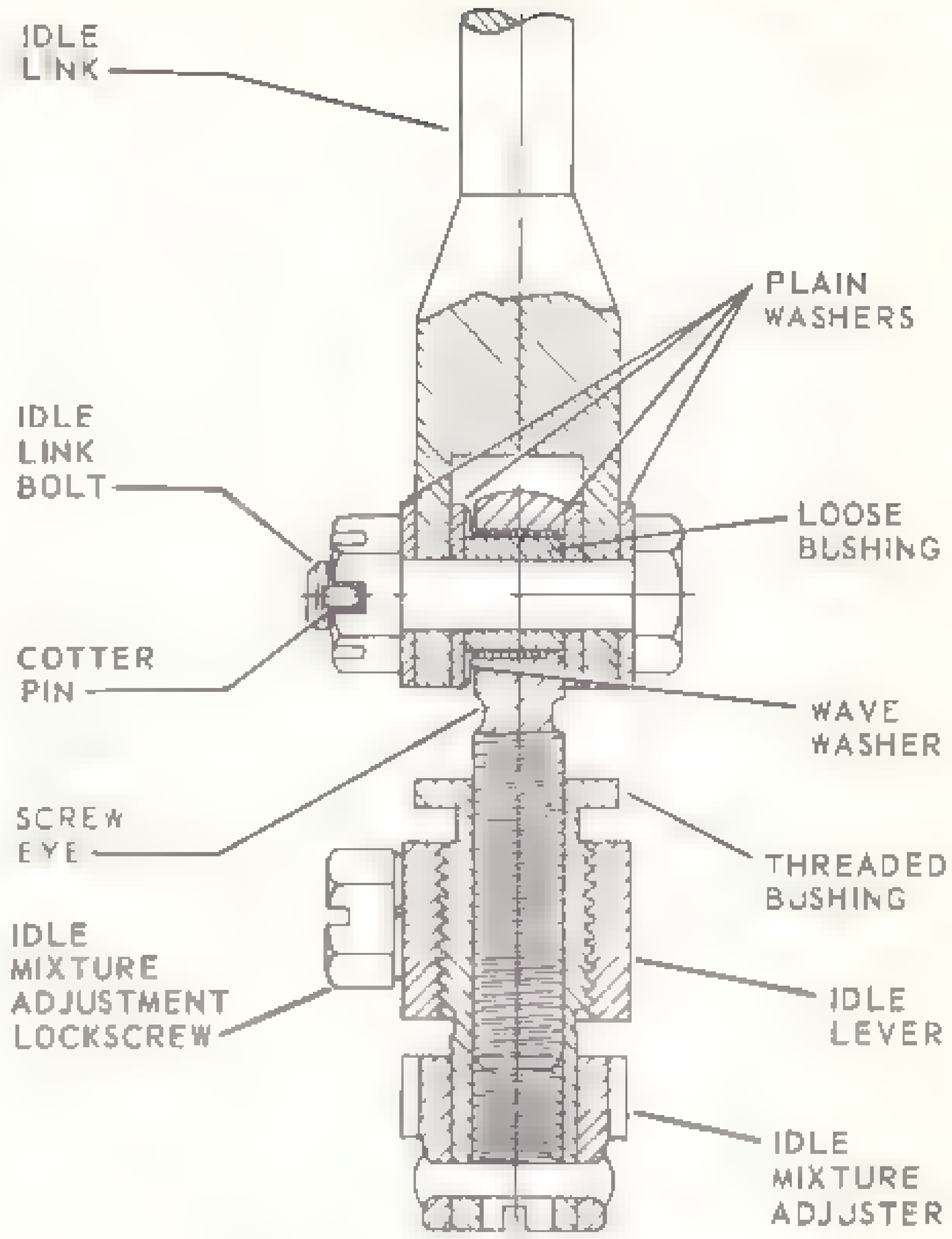


Figure 5–83. Cross section of adjusting idle indicator

Note

One revolution of the eye of the idle adjusting screw is equivalent to approximately 13 notches of the adjusting idle indicator.

(3) Connect idle link (10, figure 5–82) and eye of idle adjusting screw (8) with idle link bolt (5) and castle nut (9), using extreme care to assure that various parts are in their correct position. (See figure 5–83.)

(4) Place four plain washers in position as shown in figure 5–83. Note that wave washer fits over outside diameter of loose bushing between eye of idle adjusting screw and plain washer.

(5) Tighten castle nut until idle yoke and plain washers clamp loose bushing. Wave washer allows freedom of movement without looseness. Secure castle nut with new cotter pin. (See figure 5–83.)

(6) Operate engine and make idle mixture checks and adjustments as outlined in paragraphs *a* and *b* above. In extreme case, it might be necessary to adjust eye of idle adjusting screw (8, figure 5–82) several turns before it is correctly located. When idle adjusting screw is properly located, idle mixture will be correct when adjusting idle indicator (6) is at center of its travel.

5–206. Inlet Fuel Strainer Assembly. The inlet fuel strainer assembly is located in the fuel inlet chamber on the right side of the carburetor below the fuel inlet elbow. The inlet fuel strainer assembly filters fuel as it enters the inlet chamber of the carburetor.

a. Removal. (1) Place BATT and GEN switches in OFF position and shut off fuel supply to carburetor.

(2) Open nose doors.

(3) Remove upper shroud panel. (Refer to paragraph 5–189.)

(4) Remove lock wire from bolt securing cover and inlet fuel strainer assembly.

(5) Remove bolt, cover, gasket, and inlet fuel strainer assembly from carburetor.

b. Cleaning. Clean inlet fuel strainer assembly using a soft bristle brush and solvent (item 4, table 1–8).

c. Inspection. Inspect inlet fuel strainer assembly for corrosion, cracks, distortion, and clogging; wire-mesh for separation or damage.

d. Installation. (1) Place new gasket on cover. Insert inlet fuel strainer assembly, gasket, and cover into inlet chamber of carburetor and secure with bolt. Secure bolt with lock wire.

(2) Perform pressure check on carburetor and check for leaks at inlet fuel strainer assembly.

(3) Install upper shroud panel. (Refer to paragraph 5–192.)

(4) Close nose doors.

5–207. Primer Solenoid Valve. The PD-12R1 injection carburetor incorporates an electric primer solenoid valve to supply an unmetered supply of fuel, at engine pump pressure, to the engine induction priming system downstream from the throttle valves. The primer solenoid valve is normally closed by spring action. The solenoid (coil) within the primer solenoid valve, when energized, overcomes the spring force and opens the valve. The solenoid (coil) design permits continuous operation without excessive temperature rise. Installation of the primer solenoid valve to the carburetor does not provide a positive ground; therefore, a shielded cable or grounding strap must be used for direct connection to the aircraft frame to provide a satisfactory positive ground.

a. Removal. (1) Open nose doors.

(2) Place BATT and GEN switches in OFF position and disconnect external power from external power source.

(3) Place fuel selector valve in OFF position.

(4) Disconnect electrical plug (12, figure 5–81) from primer solenoid valve (4).

(5) Disconnect primer line from elbow on primer solenoid valve (4).

(6) Remove nuts and washers securing primer solenoid valve (4) to carburetor (6).

(7) Remove primer solenoid valve (4) and gasket from carburetor (6). Discard gasket.

b. Inspection. Inspect primer solenoid valve for cracks, corrosion, distorted mating surfaces, and loose or damaged components.

c. Installation. (1) Place new gasket and primer solenoid valve (4, figure 5–81) on carburetor (6) and secure with washers and nuts.

(2) Connect primer line to elbow on primer solenoid valve (4).

(3) Connect electrical plug (12) to primer solenoid valve (4). Secure electrical plug with lock wire.

(4) Pressure check primer solenoid valve for leakage.

(5) Close nose doors.

Section X Power Controls

5–208. Description. The power controls are comprised of a series of mechanically integrated components which are designed, constructed, and strategically positioned in mechanical sequence, from the pilots' compartment to the engine air induction system and carburetor, to dictate desired air temperature and fuel consumption of the carburetor. The power controls consist of the throttle control system, carburetor mixture control system, carburetor air temperature control system, and control quadrant.

5–209. Throttle Control System (Helicopters Serial No. Prior to 55-4462). The throttle control system (figures 5–84 and 5–85) provides partial synchronization between the throttle setting and the collective pitch control setting. The throttle control system connects a motorcycle-type grip on both the pilot's and copilot's collective pitch control with the throttle arm on the carburetor. The principal components of the system from the flight compartment to the engine are: motorcycle-type grips; a torque tube installation coupled to the right end of the collective pitch control torque tube; a bell crank installation on the right cabin wall, a limit switch installation mounted below the bell crank installation; a torque tube mount assembly and a torque tube installation, both mounted on the forward surface of the cabin forward bulkhead in the clutch compartment; a synchronizer assembly mounted just below the torque tube mount assembly; three pulley installations mounted on the forward surface of the canted bulkhead; and a support assembly mounted beside the carburetor air intake duct as shown in figure 5–24. The three pulley installations are interconnected by cables. The lower pulley installation is connected to the synchronizer assembly by an override strut; all other components of the system are interconnected by rods. The torque tube installation in the clutch compartment is connected to the collective portion of the main rotor auxiliary servo unit by two rods and a bell crank. An increase or decrease in collective pitch causes a corresponding increase or decrease in the throttle setting through the action of the synchronizer assembly. The throttle can be opened or closed by rotating the motorcycle-type grip without moving the collective pitch control. The limit switch prevents the starter from operating unless the collective pitch control is in low pitch position and the throttle is closed. The override strut prevents damage to the throttle control system if the collective pitch control is moved while the throttle is at an extreme of travel.

5–210. Cleaning. Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

5–211. Inspection. a. Inspect throttle control system for binding and freedom of movement.

b. Inspect pulleys for freedom of rotation, security of mounting; insure that each pulley is properly secured to its respective bracket installation or attaching point.

c. Inspect control cables for fraying, dirt, oil, grease, and proper position in grooves of pulleys; inspect each control cable turnbuckle for security of installation.

d. Inspect bell cranks for binding, ease of pivoting, cracks, and security of mounting.

e. Inspect fairlead for wear, cracks, and security of mounting.

f. Inspect push-pull rods for dents, cracks, corrosion, and security of installation.

g. Inspect rod end bearings for binding, wear, and security.

5–212. Throttle Synchronizer (Helicopters Serial No. Prior to 55-4462). The throttle synchronizer (figure 5–86) is mounted just below the torque tube mount assembly on the forward surface of the cabin forward bulkhead in the clutch compartment. The throttle synchronizer is actuated by the pilot's control quadrant by a lever which is connected to the bell crank of the throttle synchronizer. From the bell crank, motion is directed through a series of components to the carburetor.

a. Cleaning. Clean throttle synchronizer of all dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

b. Inspection. (1) Inspect throttle synchronizer for proper operation.

(2) Inspect throttle synchronizer for security of mounting and security of attaching hardware.

(3) Inspect bell cranks for binding, ease of pivoting, cracks, and security of mounting.

5–213. Carburetor Mixture Control System (Helicopters Serial No. Prior to 55-4462). The carburetor mixture control system (figure 5–87) extends from the lever, marked MIXTURE on the control quadrant in the pilots' compartment, to the mixture control arm on the carburetor. The movement of the lever is conveyed by a system of pulleys and cables from the control quadrant to a torque tube installation located on the canted bulkhead. From there, movement

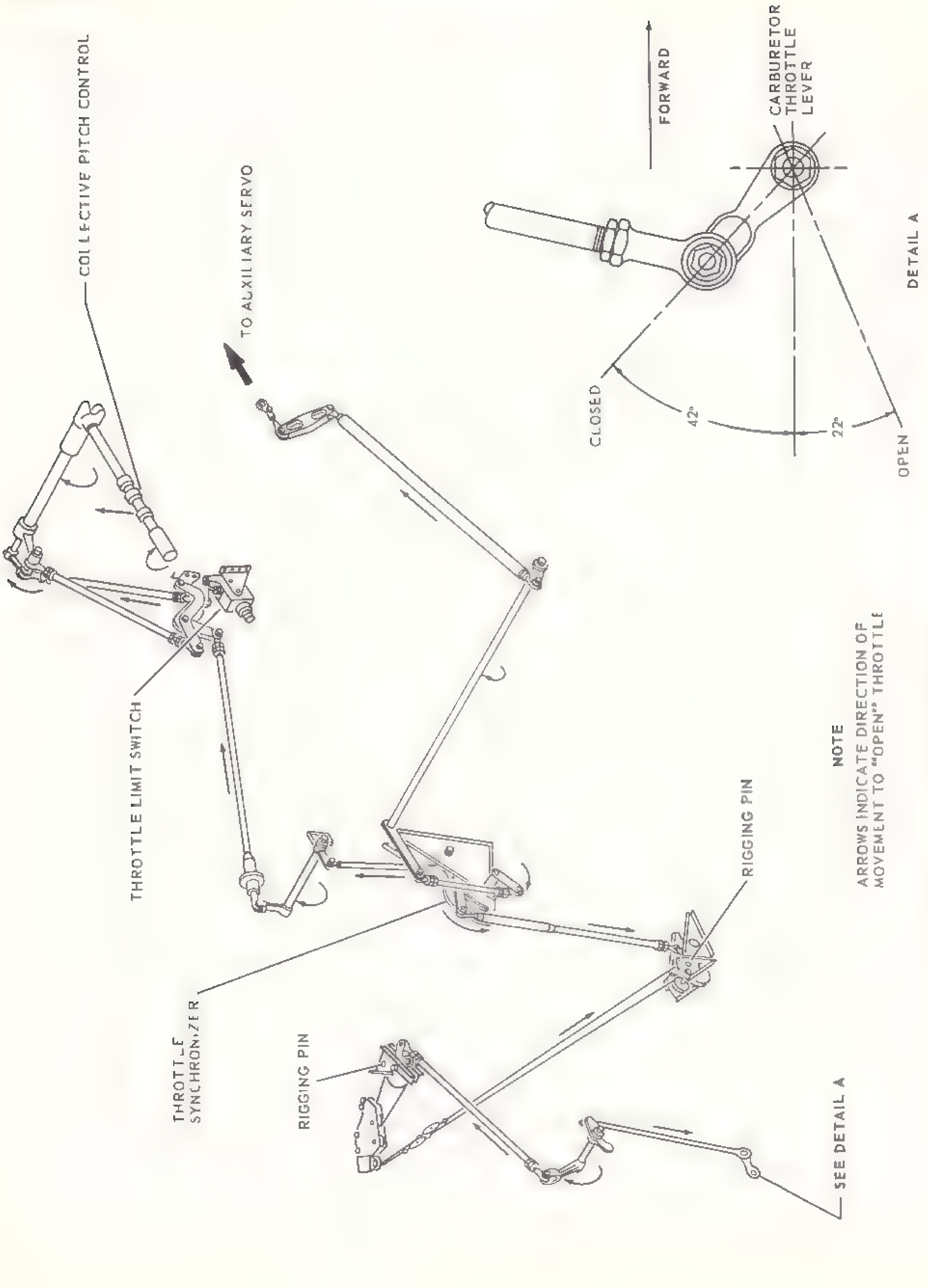
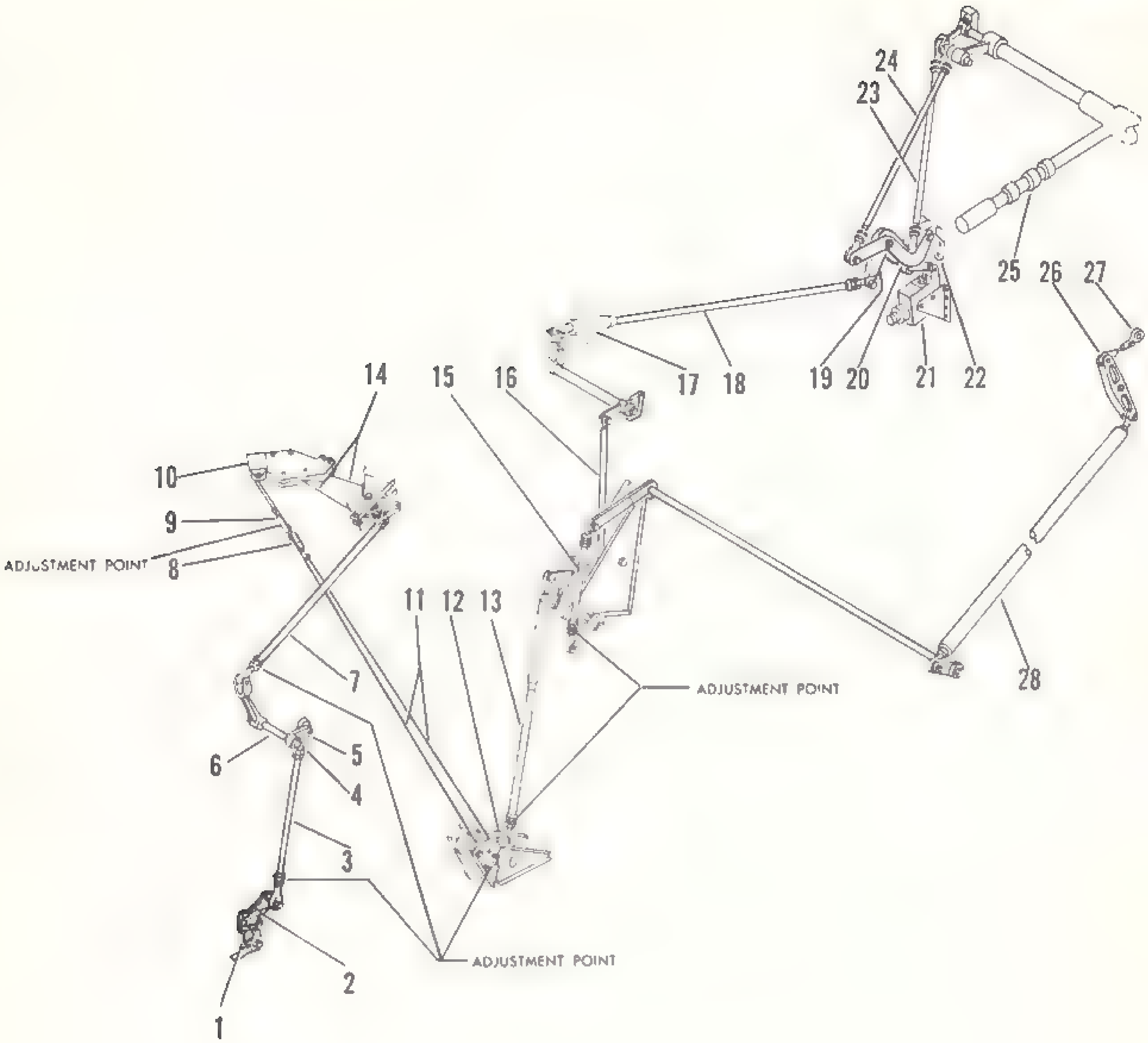


Figure 5–84 Throttle control system schematic diagram (helicopters serial No. prior to 55-4462)



1. Lever (Throttle)
2. Control Arm (Carburetor)
3. Short Rod (Throttle)
4. Check Nut
5. Lever (Throttle)
6. Shaft
7. Long Rod (Throttle)
8. Turnbuckle Barrel
9. Turnbuckle Barrel
10. Pulley Assembly
11. Cable Assembly
12. Pulley and Bracket Assembly
13. Strut Assembly
14. Cable Assembly
15. Rod (Throttle)
16. Rod (Throttle)
17. Fire Seal
18. Horizontal Rod
19. Bell Crank Assembly
20. Lever
21. Throttle Limit Switch
22. Mounting Block
23. Rod (Aft)
24. Rod (Forward)
25. Collective Pitch Control
26. Bell Crank Assembly
27. Short Rod
28. Long Rod

Figure 5—85. Throttle control system (helicopters serial No. prior to 55-4462)

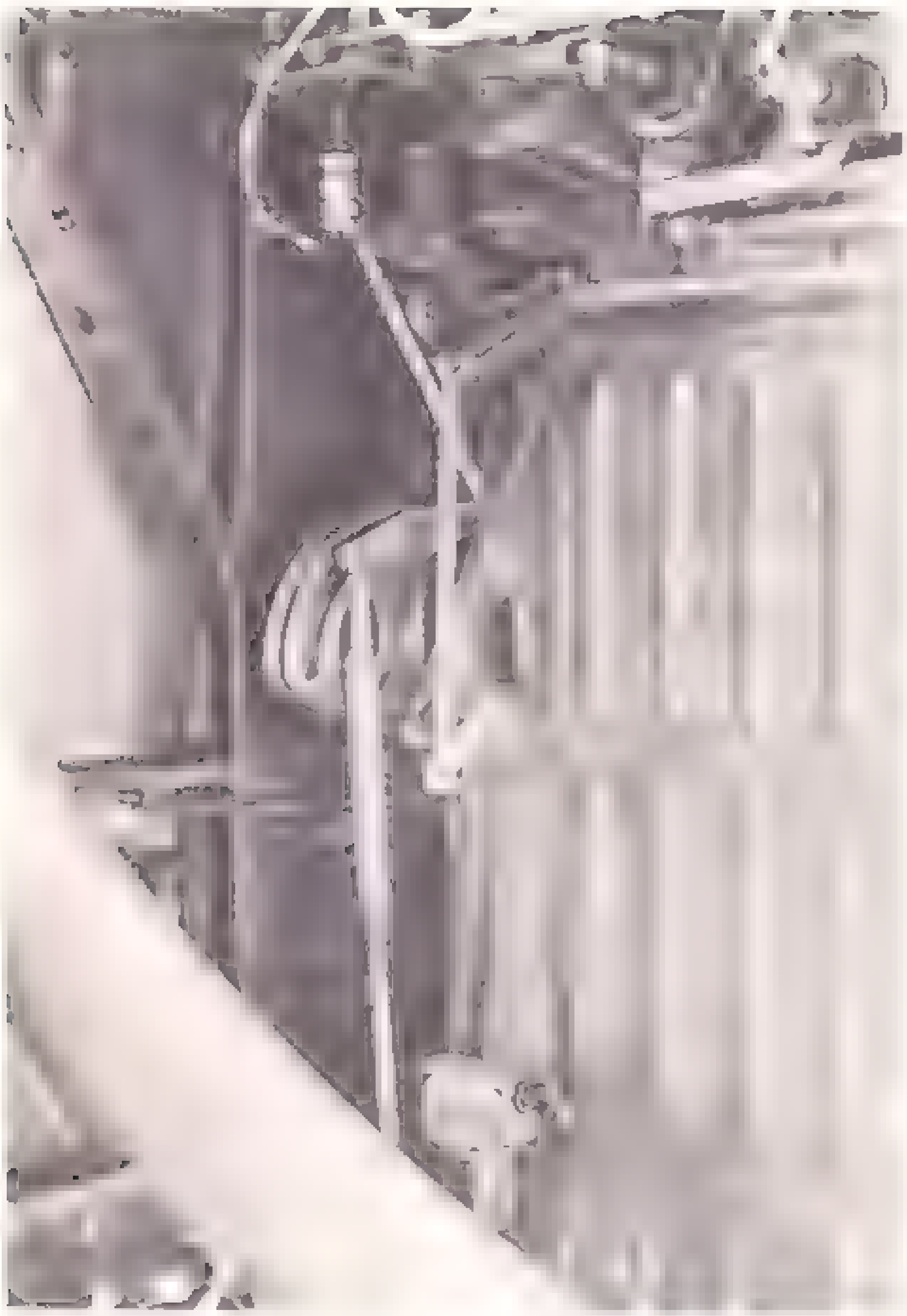


Figure 5—86. Throttle synchronizer (helicopters serial No. prior to 55-4462)

is transmitted to the carburetor by rods and levers, as shown in figure 5—24. The mixture selected by the pilot when he sets the lever on the control quadrant is automatically produced in the carburetor.

5—214. Cleaning. Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1—8).

5—215. Inspection. Inspect carburetor mixture control system in accordance with paragraph 5—211.

5—216. Carburetor Air Temperature Control System (Helicopters Serial No. Prior to 55-4462). The carburetor air temperature control system (figure 5—87) extends from the lever, marked CARB HEAT on the control quadrant in the pilots' compartment, to a lever on the side of the air intake duct located on top of the carburetor. The movement of the CARB HEAT lever is conveyed by a system of pulleys and cables from the control quadrant to a torque tube installation located on the canted bulkhead. From there, movement is transmitted to the lever on the air intake duct by a rod, as shown in figure 5—24. The carburetor air temperature control system prevents formation of ice in the carburetor by operating doors in the cold air and hot air ducts of the air intake duct, thus allowing the pilot to regulate the temperature of air entering the carburetor. Movement of the CARB HEAT lever operates both doors simultaneously, and the linkage between the doors is so adjusted that when one door is fully open, the other door is fully closed.

5—217. Cleaning. Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1—8).

5—218. Inspection. Inspect carburetor temperature control system in accordance with paragraph 5—211.

5—219. Control Quadrant (Helicopters Serial No. Prior to 55-4462). The control quadrant (figure 5—88) is installed in the control console between the pilot's and copilot's seats. The quadrant houses two levers. One lever, marked MIXTURE, operates the carburetor mixture control system. The other lever, marked CARB AIR, operates the carburetor air temperature control system. A two-way ratchet is installed under the CARB AIR lever. This ratchet must be disengaged before moving the lever in either direction. A one-way ratchet is installed under the MIXTURE lever between the NORMAL and IDLE CUT-OFF positions. This ratchet must be disengaged before moving the lever to the IDLE CUT-OFF position. The carburetor mixture control cables and carburetor air temperature control cables are connected to pulleys at the bottom of the control quadrant. On helicopters serial No. 54-2864 and subsequent, the engine primer switch is located on the right side of the control quadrant below the carburetor mixture control lever.

5—220. Cleaning. Clean control quadrant of all dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1—8).

5—221. Inspection. a. Inspect control quadrant for cracks.

b. Inspect levers for cracks and freedom of operation.

c. Inspect pulleys for cracks, wear, and security of mounting.

5—222. Throttle Control System (Helicopters Serial No. 55-4462 and Subsequent). The throttle control system (figures 5—89 and 5—90) provides partial synchronization between the throttle setting and the collective pitch control setting. The throttle control system connects a motorcycle-type grip on both the pilot's and copilot's collective pitch control with the throttle arm on the carburetor. The principal components of the system, from the pilots' compartment to the engine, are: motorcycle-type grips; a pulley bracket installation attached to the collective pitch control; a

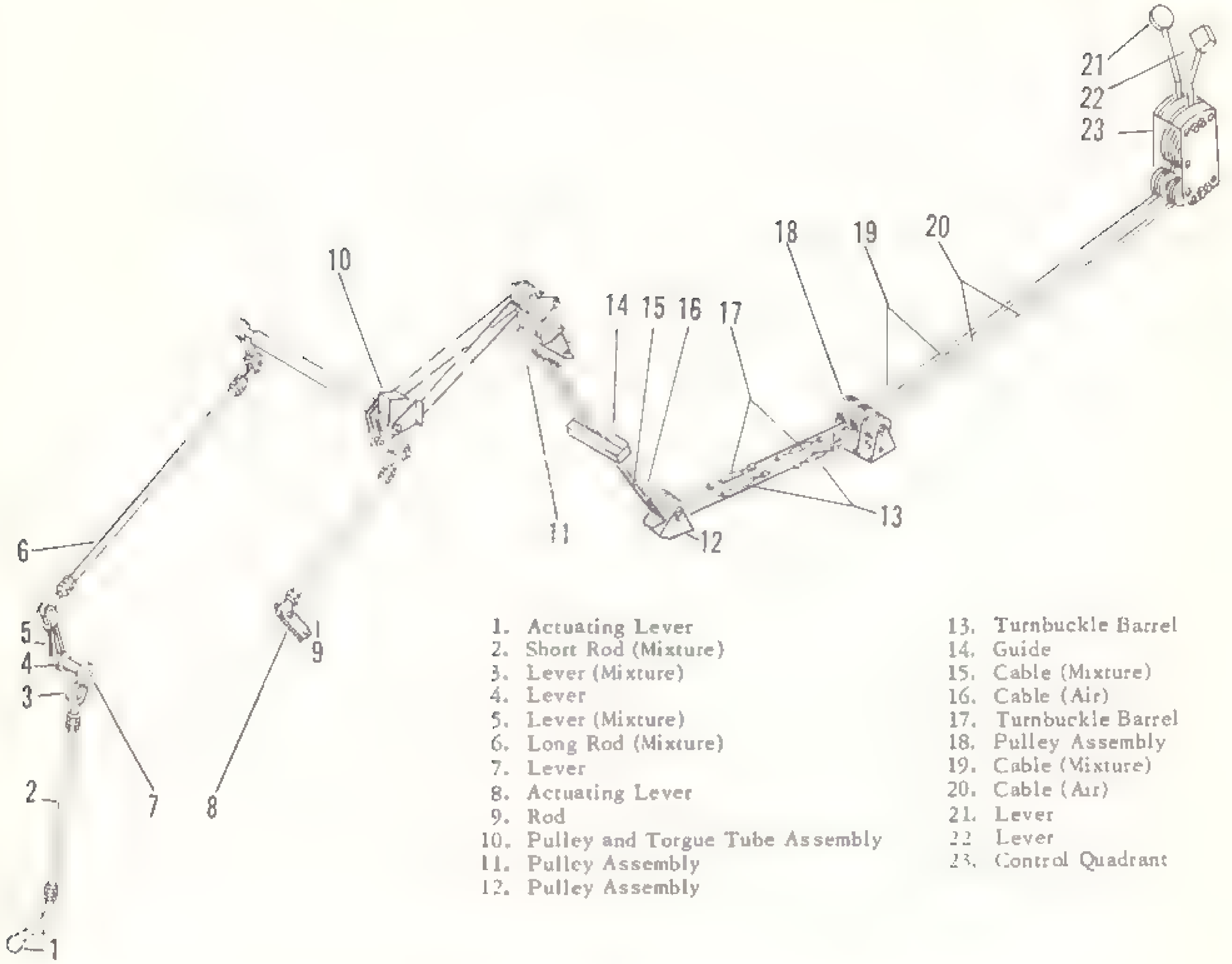


Figure 5–87. Carburetor mixture and carburetor air temperature control systems (helicopters serial No. prior to 55-4462)

Figure 5–88. Control quadrant (helicopters serial No. prior to 55-4462)

pulley bracket assembly at the right side of the pilots' compartment; a torque tube installation mounted on the forward surface of the cabin forward bulkhead in the clutch compartment; an arm assembly secured to the right side of the helicopter in the clutch compartment, as shown in figure 5–91; a pulley bracket assembly secured to the frame of the helicopter in the clutch compartment below the arm assembly; a pulley bracket assembly attached to the floor of the pilots' compartment in the clutch compartment; a pulley installation attached to the top of the canted bulkhead; and a control assembly mounted beside the carburetor air intake duct. All components of the system, except the torque tube installation and the motorcycle-type grips, are interconnected by cables. The torque tube installation is connected to the collective portion of the main rotor auxiliary servo unit by two rods and a bell crank. An increase or decrease in collective pitch causes a corresponding increase or decrease in the throttle setting through the action of the arm assembly. The throttle can be opened or closed, without moving the collective pitch control, by rotating the motorcycle-type grips.

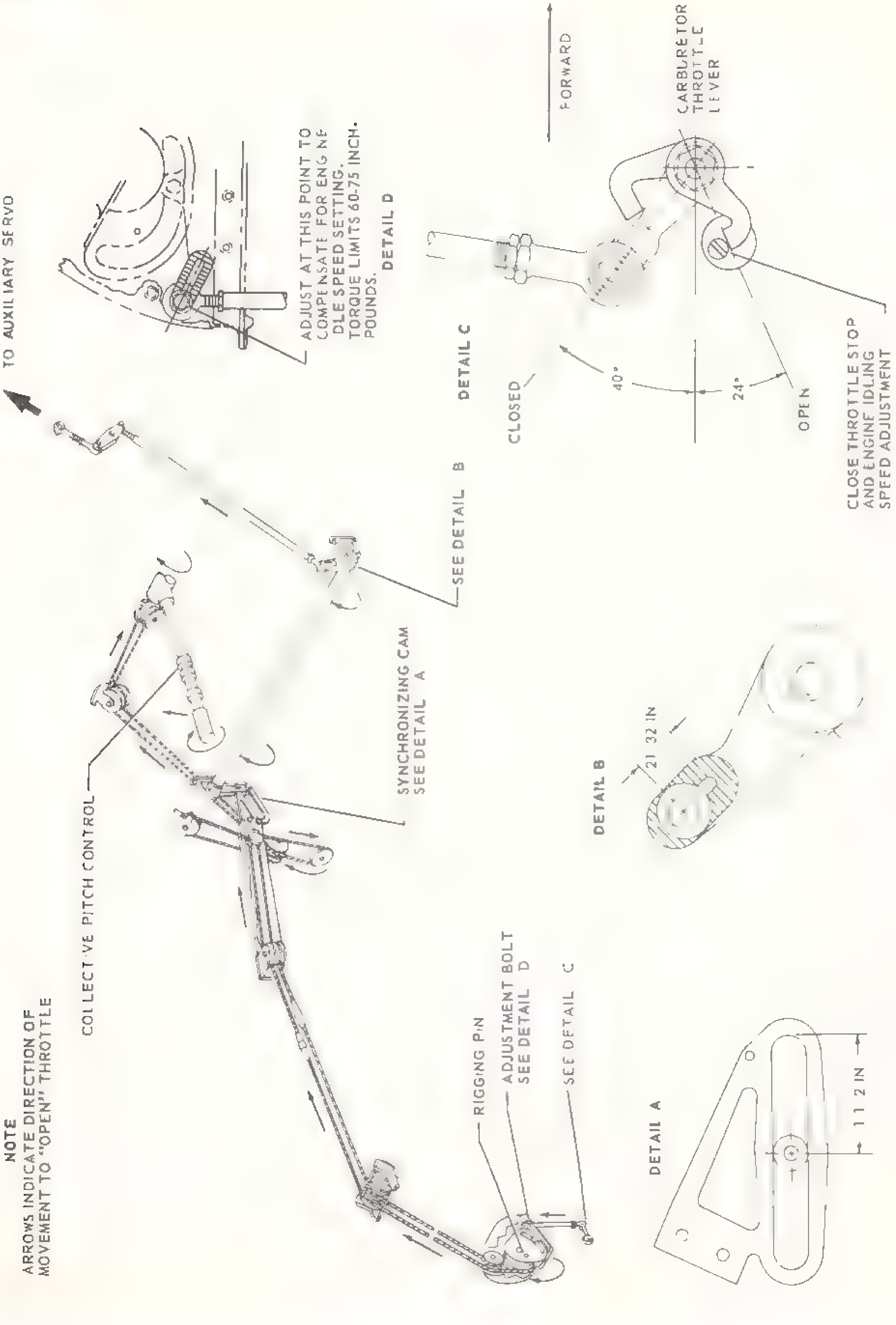
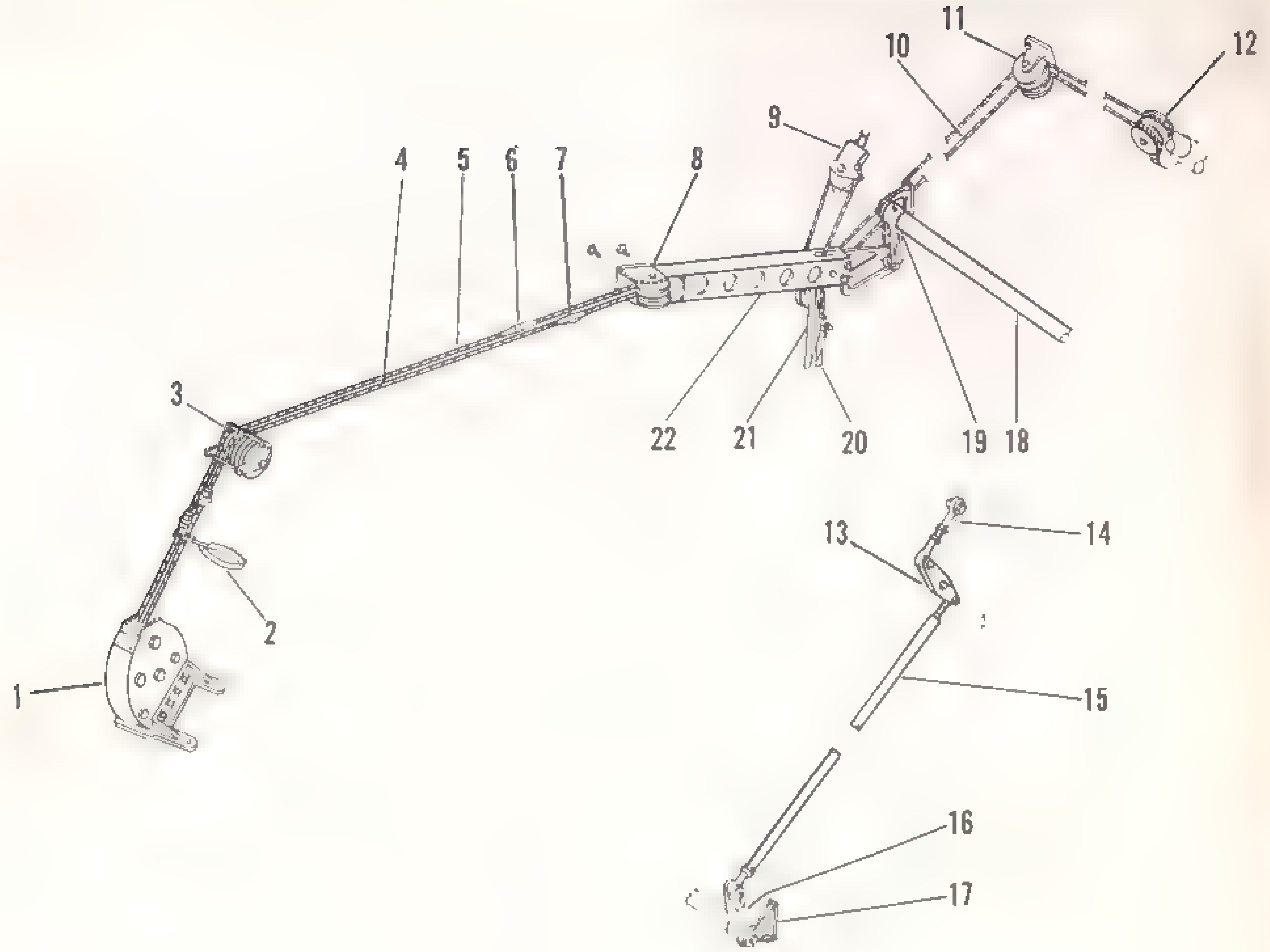


Figure 5–89 Throttle control system schematic diagram (helicopters serial No 55-4462 and subsequent)



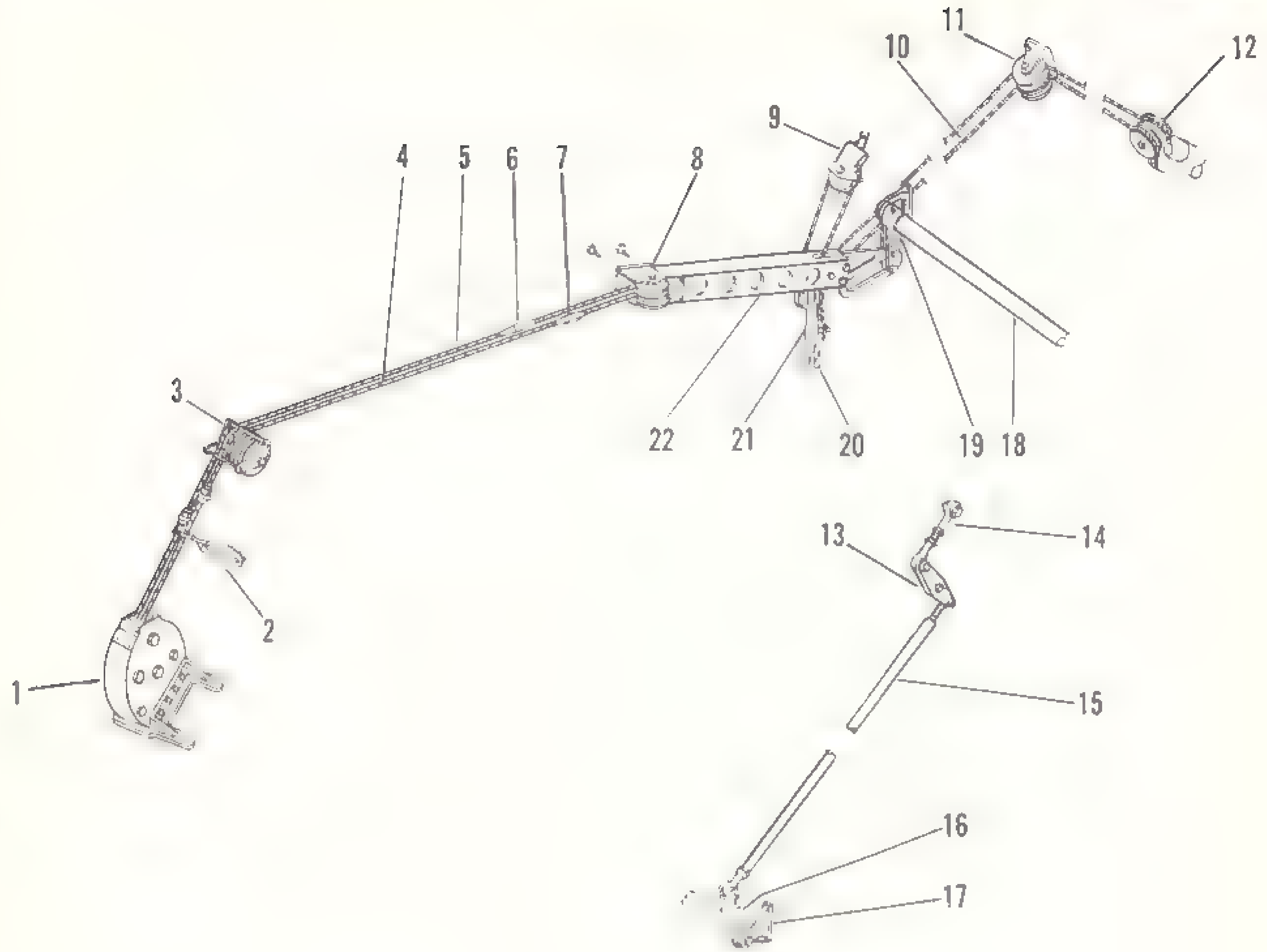
1. Control Assembly
2. Clamp
3. Pulley Assembly
4. Lower Cable
5. Upper Cable
6. Turnbuckle Barrel
7. Quick Disconnect
8. Support
9. Pulley Bracket Assembly
10. Cable
11. Pulley Bracket Assembly
12. Pulley Bracket Assembly
13. Bell Crank
14. Rod
15. Rod (Servo Actuating)
16. Lever
17. Support Assembly
18. Torque Tube
19. Lever
20. Pulley Bracket Assembly
21. Pulley Bracket Assembly
22. Arm Assembly

Figure 5–90. Throttle control system (helicopters serial No. 55-4462 and subsequent)

5–223. *Cleaning.* Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

5–224. *Inspection.* Inspect throttle control system in accordance with paragraph 5–211.

5–225. Carburetor Mixture Control System (Helicopters Serial No. 55-4462 and Subsequent). The carburetor mixture control system (figure 5–92) extends from the lever, marked MIXTURE on the control quadrant in the pilots' compartment, to the mixture control arm on the carburetor. Movement of the lever is conveyed from the control quadrant to the carburetor by a system of pulleys and cables which are routed through the console in the pilots' compartment, through the upper part of the clutch compartment and canted bulkhead, and then down to the carbruetor. The mixture selected by the pilot when he sets the lever on the control quadrant is automatically produced in the carburetor.



1. Control Assembly
2. Clamp
3. Pulley Assembly
4. Lower Cable
5. Upper Cable
6. Turnbuckle Barrel
7. Quick Disconnect
8. Support
9. Pulley Bracket Assembly
10. Cable
11. Pulley Bracket Assembly
12. Pulley Bracket Assembly
13. Bell Crank
14. Rod
15. Rod (Servo Actuating)
16. Lever
17. Support Assembly
18. Torque Tube
19. Lever
20. Pulley Bracket Assembly
21. Pulley Bracket Assembly
22. Arm Assembly

Figure 5–90. Throttle control system (helicopters serial No. 55-4462 and subsequent)

5–223. Cleaning. Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

5–224. Inspection. Inspect throttle control system in accordance with paragraph 5–211.

5–225. Carburetor Mixture Control System (Helicopters Serial No. 55-4462 and Subsequent). The carburetor mixture control system (figure 5–92) extends from the lever, marked MIXTURE on the control quadrant in the pilots' compartment, to the mixture control arm on the carburetor. Movement of the lever is conveyed from the control quadrant to the carburetor by a system of pulleys and cables which are routed through the console in the pilots' compartment, through the upper part of the clutch compartment and canted bulkhead, and then down to the carbruetor. The mixture selected by the pilot when he sets the lever on the control quadrant is automatically produced in the carburetor.

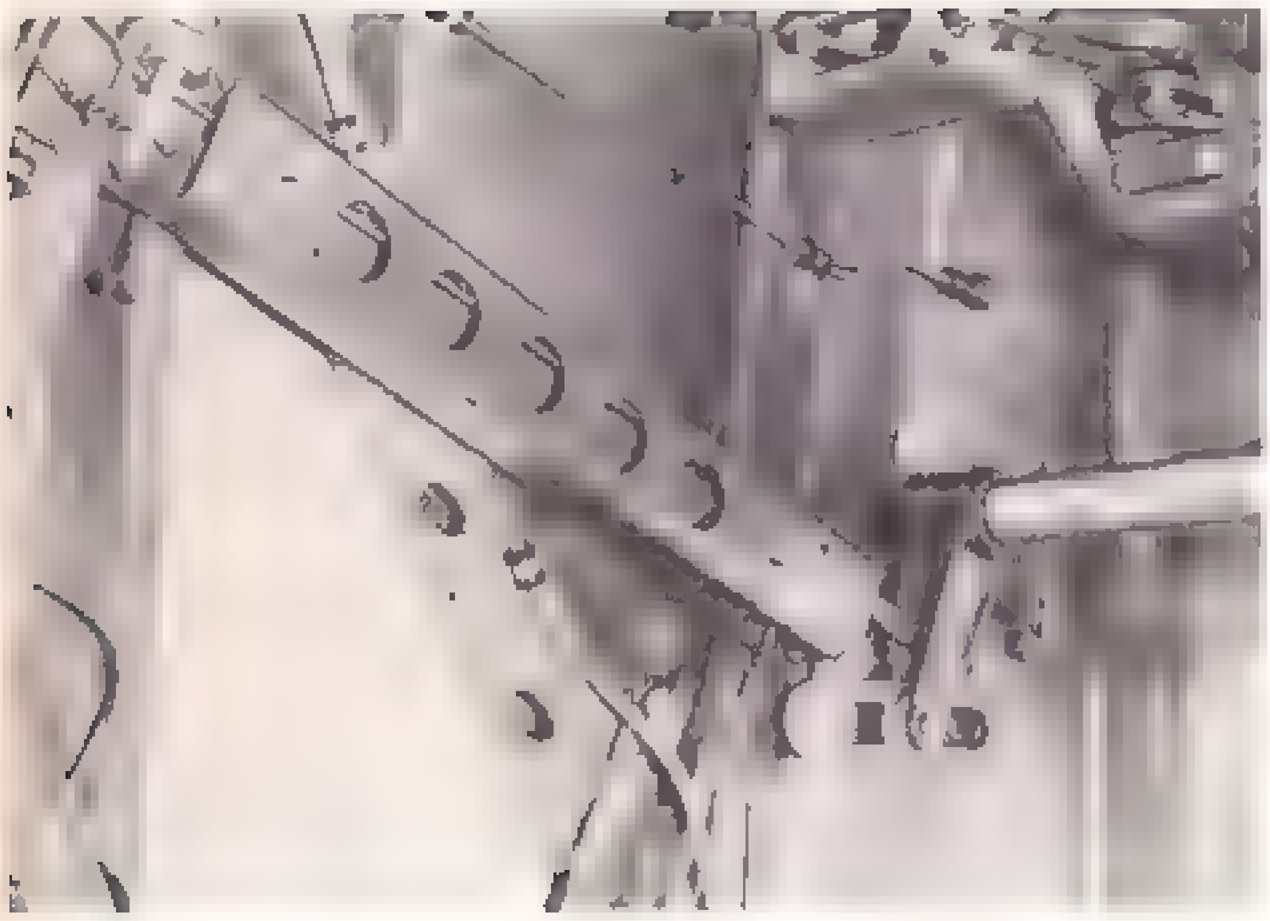
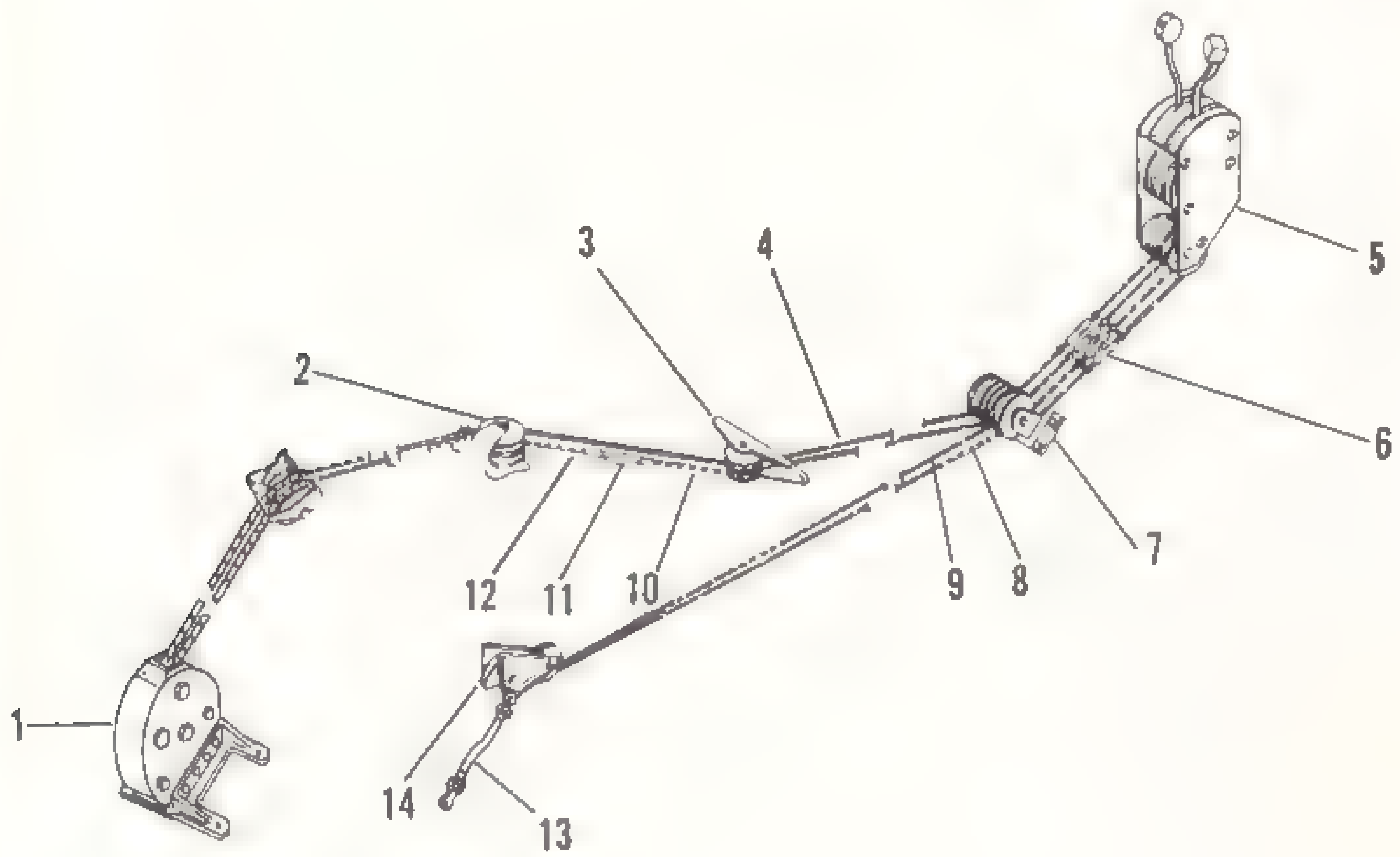


Figure 5–91. Throttle control arm assembly (helicopters serial No. 55-4462 and subsequent)

5–226. *Cleaning.* Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

5–227. *Inspection.* Inspect carburetor mixture control system in accordance with paragraph 5–211.

5–228. Carburetor Air Temperature Control System (Helicopters Serial No. 55-4462 and Subsequent). The carburetor air temperature control system (figure 5–92) extends from a lever, marked CARB HEAT on the control quadrant in the pilots' compartment, to a lever on the side of the air intake duct located on top of the carburetor. Movement of the CARB HEAT lever is conveyed by a system of pulleys and cables from the control quadrant through the console to a pulley installation located on the canted bulkhead. From there, movement is transmitted to the lever on the air intake duct by a rod. The carburetor air temperature control system prevents formation of ice



1. Control Assembly
2. Pulley Bracket Assembly
3. Pulley Bracket Assembly
4. Cable (Mixture)
5. Control Quadrant
6. Turnbuckle Barrel
7. Pulley Installation
8. Cable (Air)
9. Cable (Air)
10. Cable (Mixture)
11. Quick Disconnect (Mixture)
12. Cable (Mixture)
13. Rod Assembly
14. Pulley Assembly (Air)

Figure 5–92. Carburetor mixture and carburetor air temperature control systems (helicopters serial No. 55-4462 and subsequent)

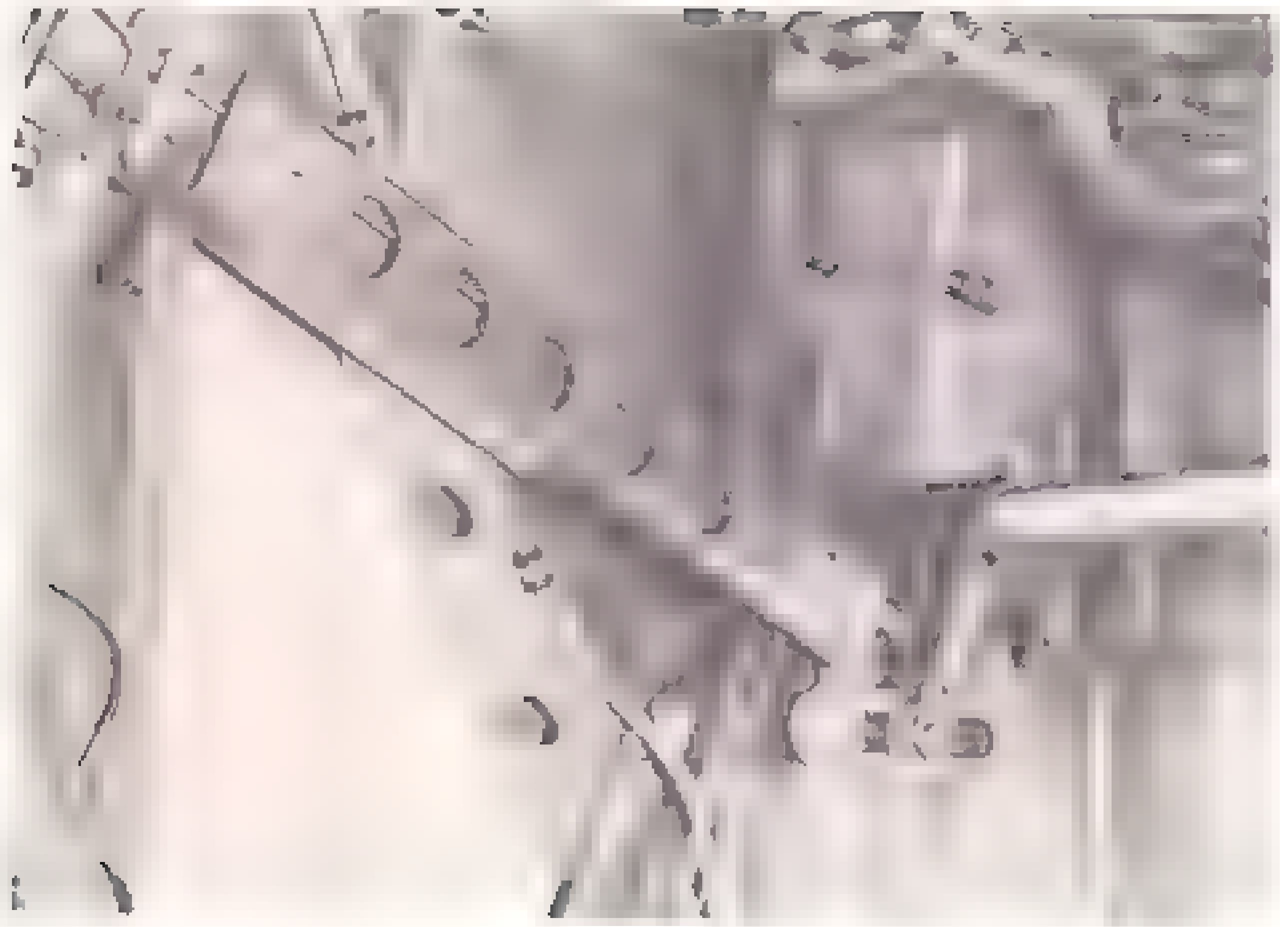
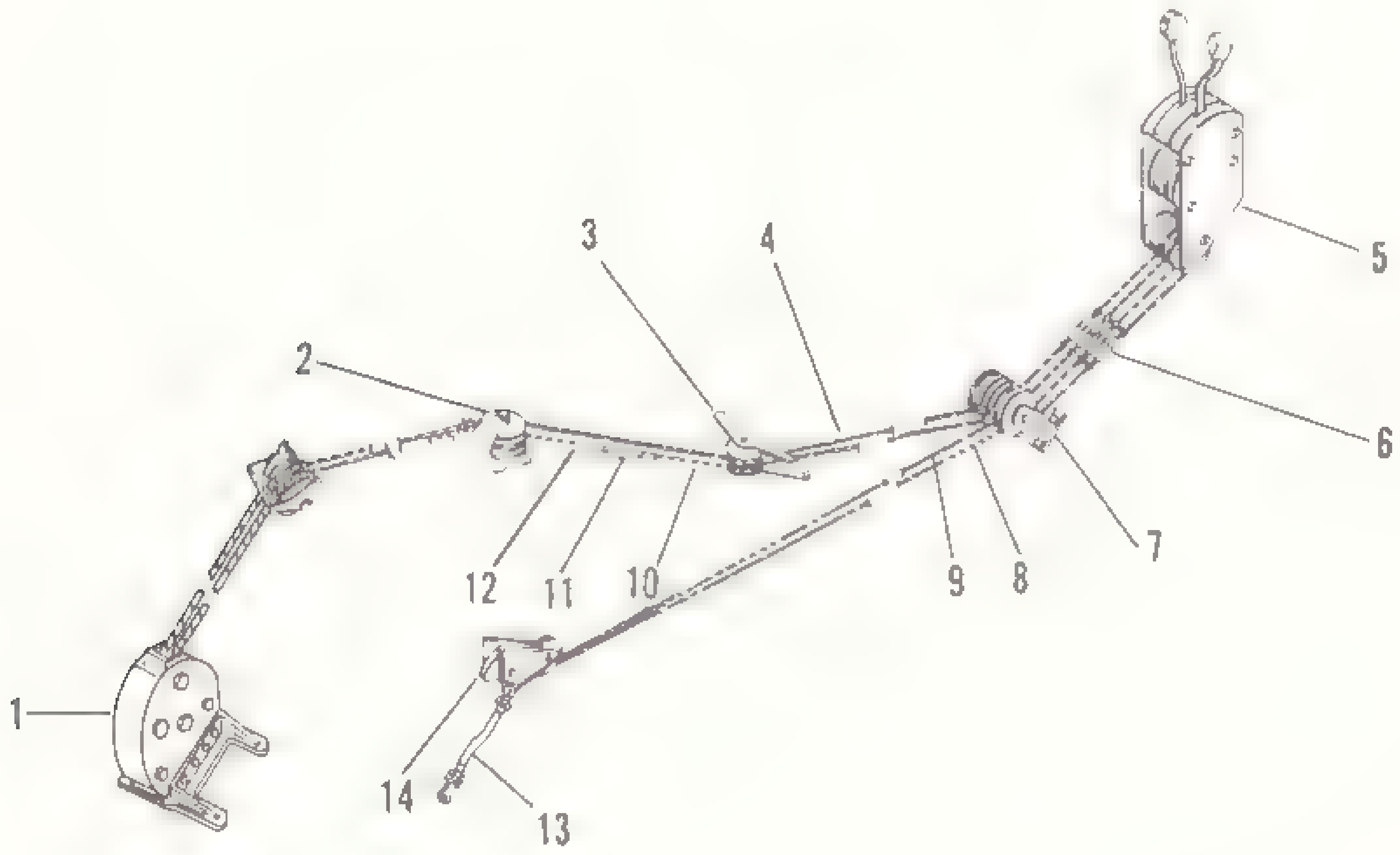


Figure 5–91. Throttle control arm assembly (helicopters serial No. 55-4462 and subsequent)

5–226. *Cleaning.* Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

5–227. *Inspection.* Inspect carburetor mixture control system in accordance with paragraph 5–211.

5–228. Carburetor Air Temperature Control System (Helicopters Serial No. 55-4462 and Subsequent). The carburetor air temperature control system (figure 5–92) extends from a lever, marked CARB HEAT on the control quadrant in the pilots' compartment, to a lever on the side of the air intake duct located on top of the carburetor. Movement of the CARB HEAT lever is conveyed by a system of pulleys and cables from the control quadrant through the console to a pulley installation located on the canted bulkhead. From there, movement is transmitted to the lever on the air intake duct by a rod. The carburetor air temperature control system prevents formation of ice



1. Control Assembly
2. Pulley Bracket Assembly
3. Pulley Bracket Assembly
4. Cable (Mixture)
5. Control Quadrant
6. Turnbuckle Barrel
7. Pulley Installation
8. Cable (Air)
9. Cable (Air)
10. Cable (Mixture)
11. Quick Disconnect (Mixture)
12. Cable (Mixture)
13. Rod Assembly
14. Pulley Assembly (Air)

Figure 5–92. Carburetor mixture and carburetor air temperature control systems (helicopters serial No. 55-4462 and subsequent)

on the carburetor by operating doors in the cold air and hot air ducts of the air intake duct, thus allowing the pilot to regulate the temperature of air entering the carburetor. Movement of the CARB HEAT lever operates both doors simultaneously, and the linkage between the doors is so adjusted that when one door is fully open, the other door is fully closed.

5–229. *Cleaning.* Clean all cables, pulleys, and brackets of dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

5–230. *Inspection.* Inspect carburetor air temperature control system in accordance with paragraph 5–211.

5–231. Control Quadrant (Helicopters Serial No. 55-4462 and Subsequent). The control quadrant (figure 5–88) is installed in the control console between the pilot's and copilot's seats. The quadrant houses two levers. One lever, marked MIXTURE, operates the carburetor mixture control system. The other lever, marked CARB AIR, operates the carburetor air temperature control system. A two-way ratchet is installed under the CARB AIR lever. This ratchet must be disengaged before moving the lever in either direction. A one-way ratchet is installed under the MIXTURE lever between NORMAL and IDLE CUT-OFF positions. This ratchet must be disengaged before moving the lever to IDLE CUT-OFF position. The carburetor mixture control cables and carburetor air temperature control cables are connected to pulleys at the bottom of the control quadrant. The engine primer switch is located on the right side of the control quadrant below the carburetor mixture control lever.

5–232. *Cleaning.* Clean control quadrant of all dirt, oil, and grease with a clean cloth slightly moistened in solvent (item 4, table 1–8).

5–233. *Inspection.* Inspect control quadrant in accordance with paragraph 5–221.

CHAPTER 6

HYDRAULIC AND PNEUMATIC SYSTEMS

Section I Scope

6–1. Purpose. The purpose of this chapter is to provide all the essential information for organizational maintenance personnel to accomplish organizational maintenance on the hydraulic and pneumatic systems in accordance with the Maintenance Allocation Chart. (Refer to Appendix II.)

6–2. Description. The hydraulic and pneumatic systems for the CH-34 helicopter consists of the hydraulic system only. The pneumatic system is not applicable to the CH-34 helicopter.

Section II Hydraulic System

6–3. Description. The hydraulic system consists of the flight controls hydraulic system, rescue hoist hydraulic system, wheel brake hydraulic system, and rotor brake hydraulic system.

6–4. General Hydraulic Leakage. The ability of an assembly to withstand leaks is dependent upon the seal produced between an O-ring and the metal surfaces. This seal, or interference fit, is very sensitive to slight imperfections in the O-ring and effects of foreign particles, such as grit and hair, lying across the sealing face. Varying degrees of leakage will result, however, even in otherwise perfect assemblies. Because of their shape, O-rings tend to roll as pressure is built up or reduced, creating a pumping action. This action causes a small quantity of fluid to escape on each cycle of pressure change and even occurs, to some degree, in static application pumping because of deflection or slight movement of the seal parts.

6–5. General Hydraulic Systems Maintenance. The following lists precautions and procedures to be followed when servicing and replacing hydraulic lines, fittings, and clamps.

a. Cap all ports and lines when hydraulic components are disconnected to prevent entry of foreign matter.

b. Keep celon caps in solution until used and install wet to obtain a tight seal by dry shrinkage.

c. Exercise extreme care to obtain clean assemblies and prevent foreign matter from entering hydraulic system. Blow all lines clear at installation.

d. Store hydraulic fluid in clean, covered containers.

e. Form flares in tubing carefully and in accordance with approved standards. Check flares for distortion and out-of-round condition before installation. Install tubing carefully and never bend tubing after installation, as unique stress will be created. Remove tubing which must be bent and bend with proper tools, observing standard bend radii.

Note

Defective flares and tubing overstressed during installation will often appear to be satisfactory and will pass initial pressure tests. Tubing, however, cannot be depended upon for continuous service.

f. Keep hydraulic components as clean as possible by periodic wiping with a lint-free cloth soaked with solvent (item 4, table 1–8). Keep piston rods clean by frequent wiping with a lint-free cloth soaked in hydraulic fluid (item 3, table 1–8).

g. Soak all packing rings and gaskets in hydraulic fluid (item 3, table 1–8) prior to installation.

h. Coat threads of fittings with hydraulic fluid (item 3, table 1–8) or petrolatum (item 28, table 1–8) at installation.

Caution

Wipe off excess petrolatum to make sure it does not enter lines.

i. Make certain hydraulic lines are connected to proper ports of hydraulic components at installation. Refer to appropriate diagrams and observe code markings on hydraulic lines and components.

j. Tighten fittings carefully. Do not overtighten.

k. Check hydraulic lines for chafing, and clamps which secure lines for proper tightness.

6–6. Flight Controls Hydraulic System. The flight controls hydraulic system contains two pressurized hydraulic systems, electrically interconnected: the primary hydraulic system and the auxiliary hydraulic system. Each system functions independently of the other, hydraulically.

6–7. Primary Hydraulic System. The primary hydraulic system (figure 6–1) operates at 1500 psi to relieve the cyclic and collective pitch control sticks of the control forces of the main rotor. Normally, the primary hydraulic system is in operation when the main rotor is turning, but it may be shut off if the system malfunctions. When this occurs, the auxiliary hydraulic system alone will relieve control forces, and flight controls will respond in a normal manner. The primary hydraulic system alone will also relieve control forces of the main rotor, allowing main rotor controls to respond normally if the auxiliary hydraulic system is shut off. Increased tail rotor control pedal loads will be evident, however, because the primary hydraulic system does not function for the tail rotor flight controls. The primary and auxiliary hydraulic systems are separate systems hydraulically, but they are interconnected electrically. Should the pressure in the auxiliary hydraulic system fall below 1000 psi, the primary hydraulic system is prevented from being shut off by a pressure switch on the auxiliary hydraulic panel which breaks the circuit to the solenoid valve when the low pressure condition exists. Similarly, a pressure switch on the primary hydraulic panel prevents the auxiliary servo hydraulic system from being shut off if the pressure in the primary hydraulic system is below 1000 psi. Hydraulic pressure for the primary hydraulic system is indicated on the pressure indicator mounted on the instrument panel. The primary hydraulic system utilizes a hydraulic pump, pressure switch, filter servo switch, reservoir, pressure relief valve, three-way solenoid valve, restrictor, snubber, pressure transmitter, pressure indicator, and hydraulic lines, fittings, and clamps. Several of the assemblies are grouped into a primary hydraulic panel at the left side of the main transmission. (See figure 6–2 or 6–3.) Access to the primary hydraulic system components may be gained by hinging down the service platforms.

6–8. *Bleeding.* The primary hydraulic system is a vented system and will automatically expel any air that enters the system through normal functioning of the system; however, to insure smooth operation of the system after a line has been disconnected, after a component has been replaced, or after air has been allowed to enter the system in any other manner, the system should be operated through at least one complete cycle of the hydraulic fluid. This should be done with normal hydraulic pressure in the system and the servo switch set so that only the system that is being bled is operating. To bleed the primary hydraulic system, move the main rotor flight controls through all extreme and intermediate positions enough times to insure that the hydraulic fluid has traveled through the system at least once.

6–9. *Hydraulic Pump.* A piston-type, gear-driven constant-displacement, variable-delivery hydraulic pump (1, figure 6–1) delivers hydraulic fluid at 1500 psi to meet the demand of the primary hydraulic system. Hydraulic fluid is drawn from the reservoir to the pump. At the pump, the fluid is sent into the system or bypassed internally and returned to the reservoir. An overboard drain is provided. The pump is mounted on the left side of the main transmission accessory cover. Access to the pump is gained by hinging down the service platform on the left side of the helicopter.

a. Removal. (1) Disconnect return hose assembly from elbow on top of hydraulic pump.

(2) Disconnect supply and pressure hose assemblies from reducers at rear of hydraulic pump.

(3) Disconnect drain tube from bottom of hydraulic pump.

(4) Remove two nuts and washers securing filter bracket on flange of hydraulic pump. Remove filter and bracket away from hydraulic pump.

(5) Remove nuts and washers securing hydraulic pump and gasket on accessory case of main transmission. Remove hydraulic pump and gasket.

(6) Remove elbow and reducers from hydraulic pump.

b. Cleaning. Clean hydraulic pump with a clean, lint-free cloth moistened with solvent (item 4, table 1–8).

c. Inspection. (1) Inspect hydraulic pump for cracks, dents, elongated mounting holes, or malformed threads.

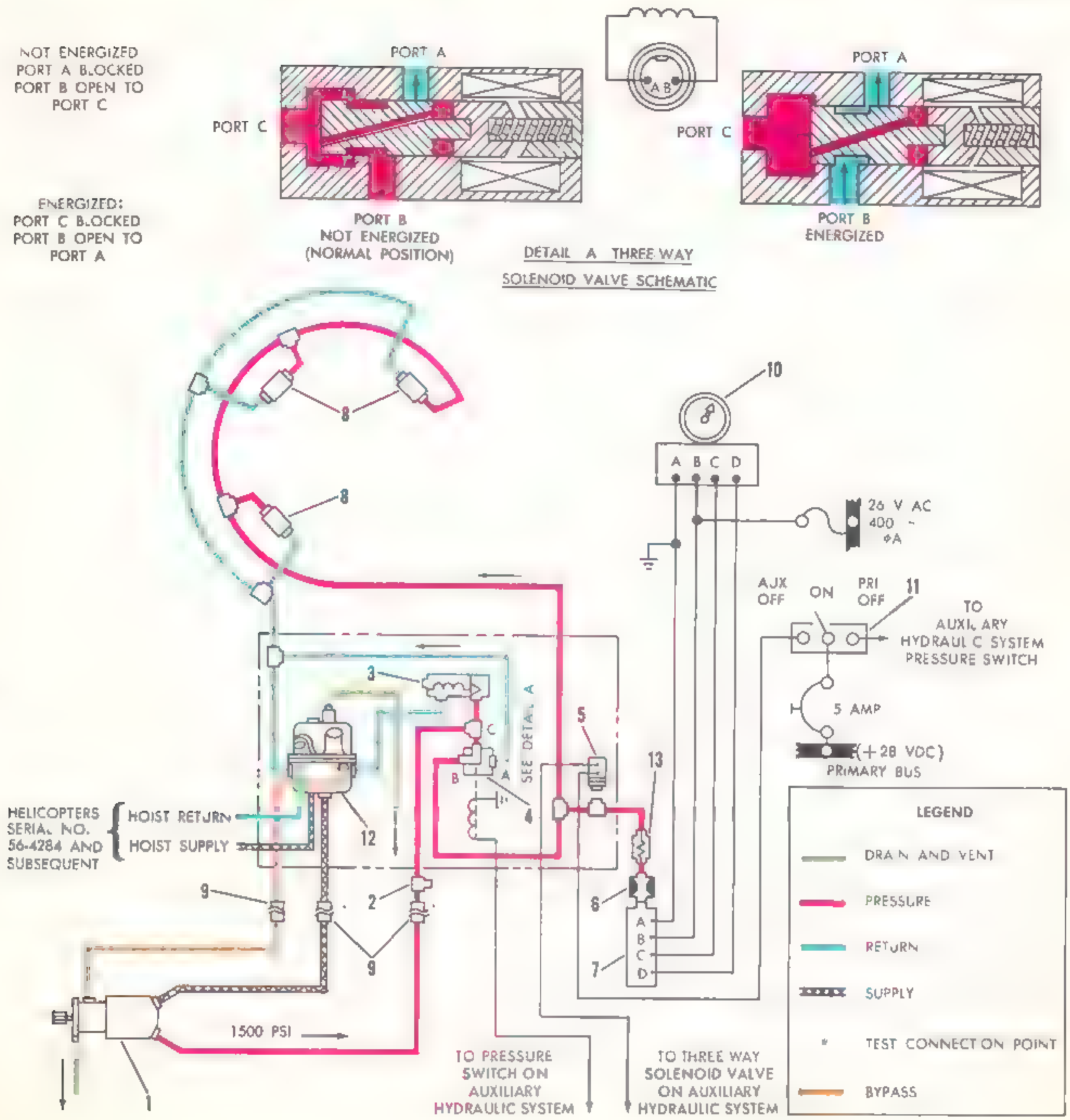
(2) Inspect elbow and reducers for cracks and malformed threads.

d. Installation. (1) Position new gasket and hydraulic pump on studs in accessory case of main transmission. Install washers and nuts on upper left and lower right studs.

(2) Position filter bracket with filter attached on two studs, without nuts, protruding through flange of hydraulic pump and install washers and nuts.

(3) Install reducers in rear and elbow in top of hydraulic pump.

(4) Connect drain line to bottom of hydraulic pump.



1. Hydraulic Pump
2. Filter
3. Pressure Relief Valve
4. Three-Way Solenoid Valve
5. Pressure Switch
6. Restrictor
7. Pressure Transmitter
8. Main Servo Assemblies
9. Quick Disconnects
10. Pressure Indicator
11. Servo Switch
12. Reservoir
13. Snubber

Figure 6–1. Primary hydraulic system schematic diagram

Figure 6—2. Primary hydraulic panel installed (helicopters serial No. prior to 56-4284)

Figure 6—3. Primary hydraulic panel installed (helicopters serial No. 56-4284 and subsequent)

(5) Connect supply and pressure hose assemblies to reducers at rear of hydraulic pump.

(6) Connect return hose assembly to elbow in top of hydraulic pump.

6—10. Pressure Switch. The pressure switch (5, figure 6—1), located on the primary hydraulic system hydraulic panel, prevents the three-way solenoid valve in the auxiliary hydraulic system from being energized and the system from being shut off if the hydraulic pressure in the primary hydraulic system is below 1000 psi, the necessary pressure for proper primary hydraulic system operation. The electric contacts in the switch are closed when the hydraulic pressure in the primary hydraulic system is above 1000 psi. If the primary hydraulic system pressure is below 1000 psi, the contacts are open. Access to the switch is gained by hinging down the service platform on the left side of the helicopter.

a. Removal. (1) Unplug pressure switch wiring at pressure switch receptacle.

(2) Disconnect tubing from tee fitting. Disconnect hose line from elbow in restrictor.

(3) Remove screws, washers, and nuts and lift pressure switch, tee fitting, snubber, and restrictor off hydraulic panel bracket. Unscrew pressure switch from tee fitting.

b. Inspection. (1) Inspect electrical connections for evidence of corrosion and arcing.

(2) Inspect tee fitting for cracks, evidence of leakage, and stripped or malformed threads.

(3) Inspect pressure switch for cracked or malformed mounting holes.

c. Installation. (1) Screw pressure switch onto tee fitting. Position pressure switch, tee fitting, restrictor, and snubber, as a unit, on the hydraulic panel bracket. Secure with screws, washers, and nuts.

(2) Connect tubing to tee fitting. Connect hose line to elbow in restrictor.

(3) Plug pressure switch wiring to pressure switch receptacle.

Note

The pressure switch has an adapter on the plug connector permitting installation only in the correct position.

6—11. Filter. The filter (2, figure 6—1) is located on a bracket mounted to the same studs on the main transmission accessory case as the hydraulic pump. Access to the filter is gained by hinging down the service platform on left side of the helicopter.

a. Removal. (1) Disconnect hose assembly from each side of filter.

(2) Remove bolts, washers, and nuts securing filter to bracket and remove filter.

(3) Remove lock wire securing filter bowl to filter head and remove filter bowl.

(4) Remove filter element from filter bowl.

b. Cleaning. Clean filter with solvent (item 4, table 1—8).

c. Inspection. Inspect filter for cracks, dents, burrs, or malformed threads.

d. Installation. (1) Position filter element in filter bowl and install filter bowl on filter head.

(2) Secure filter bowl on filter head with lock wire.

(3) Position filter on bracket and secure with bolts, washers, and nuts.

(4) Connect hose assembly to each side of filter.

6–12. Reservoir. The reservoir (10, figure 6–4) for the primary hydraulic system is mounted on the primary hydraulic panel (figure 6–2 or 6–3) and supplies both the primary and rescue hoist hydraulic systems. A sight level gage, inspection light and bracket, filler tube, and vent line are provided as well as openings for the supply and return lines, the bypass line from the hydraulic pump, the hoist supply and return lines, and the relief tubing to the return port of the relief valve. Access to the reservoir may be gained by hinging down the service platform on the left side of the helicopter. A reservoir inspection window is installed on the copilot's side of the canted bulkhead to allow inflight visual inspection of the reservoir sight gage and main transmission.

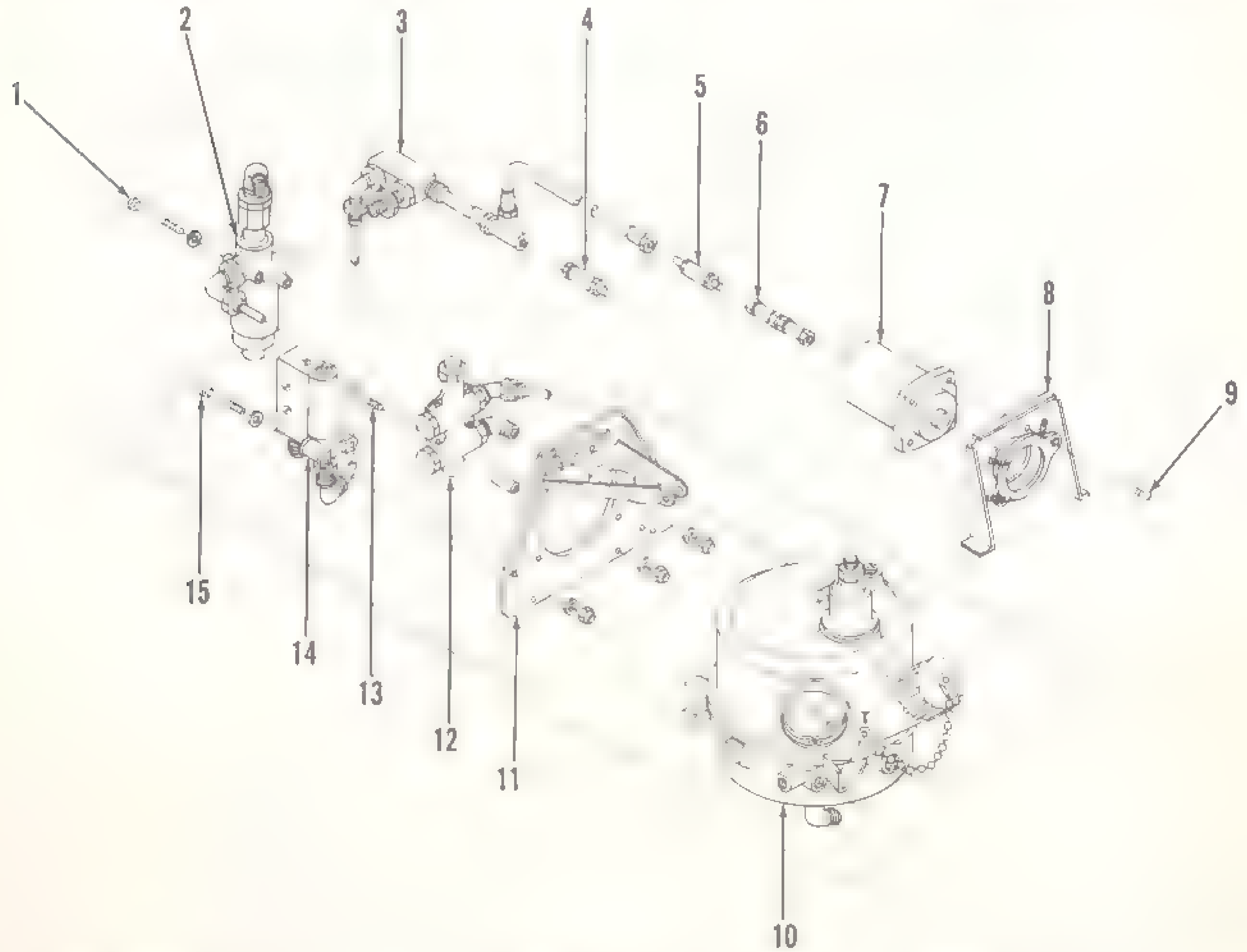
a. Removal of upper reservoir filter element. (1) Unscrew and remove adapter and gasket.

(2) Remove retainer ring and filter element.

b. Installation of upper reservoir filter element. (1) Install filter element in adapter. Install retainer ring to secure filter element.

(2) Position serviceable gasket on reservoir and screw adapter into reservoir.

6–13. Pressure Relief Valve. The primary hydraulic system is protected from excessive pressure by a pressure relief valve (12, figure 6–4) mounted at the hydraulic panel on the left side of the main transmission. The



1. Bolt, Washers, Nut
2. Three-Way Solenoid Valve
3. Manifold
4. Hydraulic Fuse
5. Restrictor
6. Snubber
7. Pressure Transmitter
8. Bracket
9. Screws
10. Reservoir
11. Bracket
12. Pressure Relief Valve
13. Screws, Washer, Spacer, Nut
14. Pressure Switch
15. Bolt, Washers, Nut

Figure 6–4. Flight controls hydraulic systems component identification

relief valve has a cracking pressure of 1750 psi; at this pressure it begins to open and return hydraulic fluid to the reservoir. Access is gained to the relief valve by hinging down the service platform on the left side of the helicopter.

a. Removal. (1) Disconnect tubing from fittings of pressure relief valve (12, figure 6–4).

(2) Remove screws, washers, spacers, and nuts (13) securing relief valve to bracket (11) and remove pressure relief valve (12).

(3) Remove fittings from pressure relief valve.

b. Cleaning. Clean pressure relief valve with a clean cloth slightly moistened in solvent (item 4, table 1–8).

c. Inspection. (1) Inspect fittings of pressure relief valve for stripped or malformed threads.

(2) Inspect pressure relief valve for cracks and elongated mounting holes.

d. Installation. (1) Install fittings on pressure relief valve (12, figure 6–4).

(2) Position pressure relief valve (12) at bracket (11) and secure with screws, washers, spacers, and nuts (13).

(3) Connect tubing to fittings in pressure relief valve (12).

6–14. Three-Way Solenoid Valve. An electrically operated, three-way solenoid valve (2, figure 6–4) furnishes a means of shutting off the primary hydraulic system. The solenoid circuit is energized by placing the servo switch on the pilot's collective pitch stick in the PRI OFF position. When the pressure in the auxiliary hydraulic system falls below 1000 psi (the pressure necessary for proper auxiliary hydraulic system operation), the solenoid valve is prevented from shutting off the primary hydraulic system by a pressure switch in the auxiliary hydraulic system. The three-way solenoid valve is located on the hydraulic panel on the left side of the main transmission. Access is gained to the solenoid valve by hinging down the service platform on the left side of the helicopter.

a. Removal. (1) Disconnect wiring at three-way solenoid valve (2, figure 6–4) receptacle.

(2) Disconnect inlet, outlet, and return lines at solenoid valve (2).

(3) Remove bolt, washers, and nut (1) and lift solenoid valve off bracket (11).

(4) Remove fittings from solenoid valve.

b. Cleaning. Clean three-way solenoid valve with a clean cloth slightly dampened in solvent (item 4, table 1–8).

c. Inspection. (1) Inspect fittings on three-way solenoid valve for stripped or malformed threads.

(2) Inspect three-way solenoid valve for cracks and elongated mounting holes.

d. Installation. (1) Install fittings on three-way solenoid valve (2, figure 6–4).

(2) Position and secure solenoid valve to bracket (11).

(3) Connect inlet, outlet, and return lines at solenoid valve.

(4) Plug wiring into solenoid valve receptacle.

Note

Plug and receptacle for solenoid valve are identified by a yellow stripe.

6–15. Pressure Transmitter. The pressure transmitter (7, figure 6–4) electrically transmits the hydraulic pressure indication in the primary hydraulic system to the primary hydraulic pressure indicator on the instrument panel. The pressure transmitter is shock-mounted on a support attached to the main transmission deck forward of the hydraulic panel. Access to the pressure transmitter is gained by hinging down the service platform on the left side of the helicopter.

a. Removal. (1) Disconnect wiring from pressure transmitter (7, figure 6–4).

(2) Disconnect pressure hose from elbow at pressure transmitter (7).

(3) Remove screws (9) and lift pressure transmitter (7) out of bracket (8).

(4) Remove elbow from pressure transmitter (7).

b. Cleaning. Clean pressure transmitter with a clean cloth slightly moistened in solvent (item 4, table 1–8).

c. Inspection. (1) Inspect fittings on pressure transmitter for stripped or elongated mounting holes.

(2) Inspect pressure transmitter for cracks or elongated mounting holes.

d. Installation. (1) Install elbow in pressure transmitter (7, figure 6–4).

(2) Position and secure pressure transmitter (7) in bracket (8). Secure with screws (9).

(3) Connect pressure hose to elbow in pressure transmitter (7).

(4) Connect wiring to pressure transmitter (7).

6–16. Restrictor and Snubber. A restrictor (5, figure 6–4) and a snubber (6) are installed in the pressure hydraulic line to the pressure transmitter. (See figure 6–1.) The restrictor and snubber prevent surges of pressure to the pressure transmitter and thereby stabilize the pressure reading which will be indicated on the pressure indicator on the instrument panel. Access to the restrictor and snubber may be gained by hinging down the service platform on the left side of the helicopter.

a. Removal. (1) Remove hydraulic line from restrictor (5, figure 6–4).

(2) Unscrew restrictor (5) from snubber (6).

(3) Unscrew snubber (6) from pressure transmitter (7).

b. Cleaning. Clean the restrictor and snubber with a clean cloth slightly moistened in solvent (item 4, table 1–8).

c. Inspection. (1) Inspect restrictor for stripped or malformed threads.

(2) Inspect snubber for stripped or malformed threads and for leakage at fitting connections.

d. Installation. (1) Screw snubber (6, figure 6–4) in pressure transmitter (7) and tighten.

(2) Install restrictor (5) in snubber (6).

(3) Install hydraulic line to restrictor (5).

6–17. Hydraulic Lines, Fittings, and Clamps. There are two types of hydraulic lines used in the primary hydraulic system, rigid aluminum alloy tube assemblies and flexible hose assemblies. The hydraulic lines use conventional fittings and clamps and can be removed or installed easily with common tools.

a. Removal. (1) Hinge down service platform on each side of main transmission and remove access covers and plates, as necessary, to gain access to hydraulic lines, fittings, and clamps.

(2) Remove attaching hardware and remove clamps from tube or hose assemblies to be removed.

(3) Disconnect tube or hose assemblies from other tube or hose assemblies or hydraulic components, and remove tube or hose assemblies.

(4) Cap open ends of tube or hose assemblies and all open ports of hydraulic components left installed to prevent entry of foreign matter into primary hydraulic system.

(5) Remove fittings (elbows or nipples) installed in fuselage structure by first noting position of fittings. Remove nuts and washers and remove fittings from fuselage structure.

b. Inspection. (1) Inspect tube assemblies for cracks and dents and end fittings for malformed threads.

(2) Inspect hose assemblies for fraying and deterioration and end fittings for malformed threads.

(3) Inspect fittings (elbows or nipples) for cracks, dents, and malformed threads.

c. Installation. (1) Position fittings (elbows or nipples) in fuselage structure as noted at time of removal and secure with washers and nuts.

(2) Remove caps from ends of tube or hose assemblies and ports of hydraulic components. Blow tube or hose assemblies clear with dry, filtered compressed air.

(3) Place tube or hose assemblies in their respective positions and connect to other tube or hose assemblies or hydraulic components.

(4) Position clamps on tube or hose assemblies and secure with attaching hardware.

(5) Bleed primary hydraulic system in accordance with paragraph 6–8 and service reservoir in accordance with table 1–5.

(6) Install access covers and plates and close service platforms.

6–18. Auxiliary Hydraulic System. The auxiliary hydraulic system (figure 6–5) operates at 1500 psi to relieve the control forces of the main and tail rotors. Normally, the auxiliary hydraulic system is always in operation when the engine is running, but it may be shut off if it malfunctions. When this occurs, the primary hydraulic system will relieve the control forces on the main rotor controls. Increased tail rotor pedal loads will be felt because the servo assembly for the tail rotor is included only in the auxiliary hydraulic system. On the other hand, if the primary hydraulic system is shut off, the auxiliary hydraulic system will relieve all control forces, and flight controls will respond in a normal manner with no increase in the control loads. Hydraulically, the auxiliary and primary hydraulic systems are separate systems, but they are interconnected electrically through a pressure switch in each system. If the pressure in one hydraulic system falls below 1000 psi, the pressure switch in that system opens and prevents the other hydraulic system from being turned off. Components of the auxiliary hydraulic system include a hydraulic pump, servo switch, reservoir, filter, three-way solenoid valve, pressure relief valve, pressure switch, hydraulic fuse, pressure transmitter, restrictor, snubber, pressure indicator, actuating cylinder assembly, and necessary interconnecting hydraulic lines with quick disconnects. Several of the components are grouped into an auxiliary hydraulic panel. On helicopters serial No. prior to 56-4313, this hydraulic panel is located in the clutch compartment. (See figure 6–6.) On helicopters serial No. 56-4313 and subsequent this hydraulic panel is located on the right side of the main transmission deck. (See figure 6–7.)

6–19. Bleeding. The auxiliary hydraulic system is a vented system and will automatically expel any air that has entered the system. All the flight controls should be operated until the hydraulic fluid has traveled through the system at least once. This should be done with normal hydraulic pressure in the system and the servo switch set so that only the auxiliary hydraulic system is being bled.

6–20. Hydraulic Pump. A piston-type, gear-driven constant-displacement, variable-delivery hydraulic pump (1, figure 6–5) delivers hydraulic fluid at 1500 psi to meet the demand of the auxiliary hydraulic system. Hydraulic fluid is drawn from the reservoir to the hydrau-

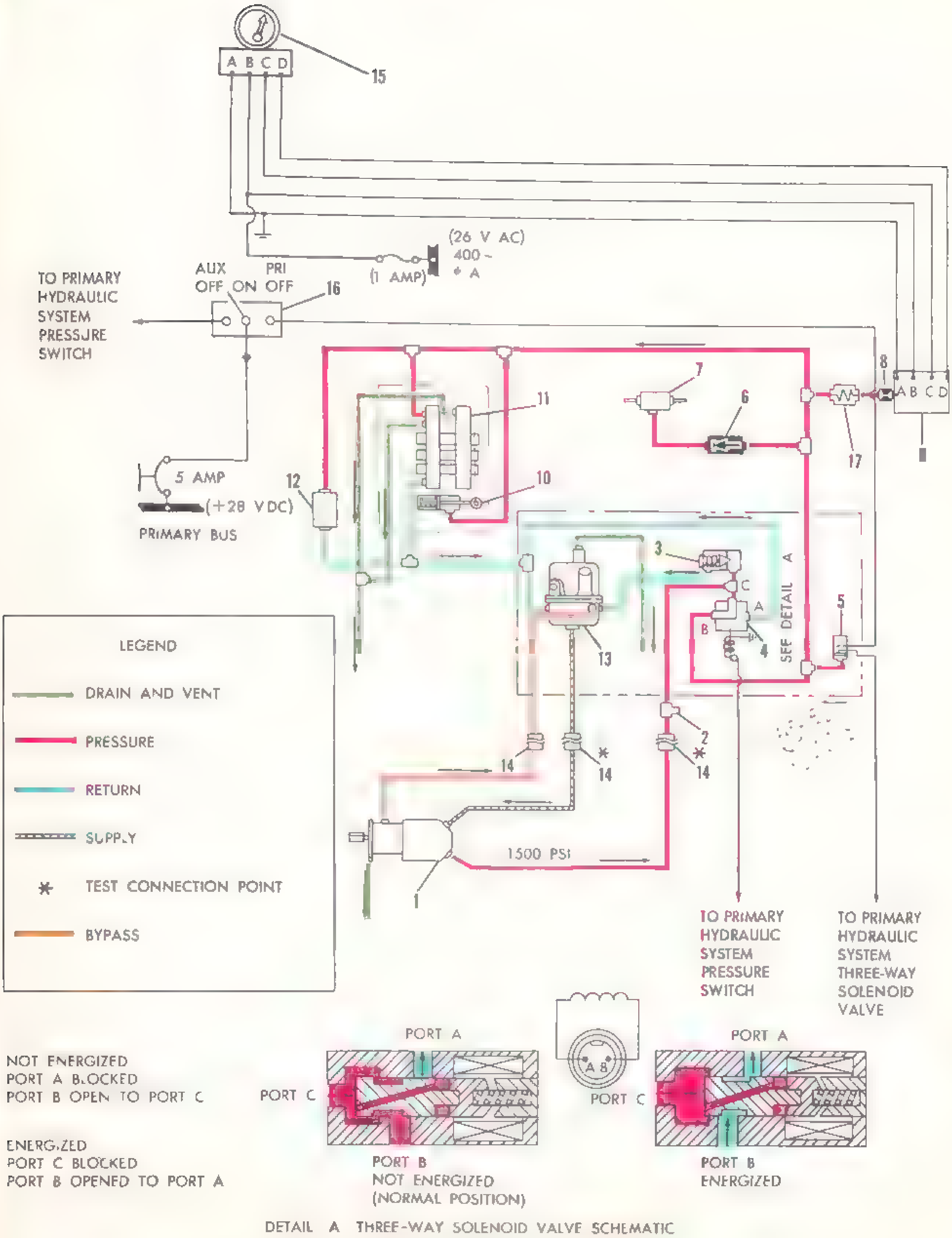


Figure 6–5. Auxiliary hydraulic system schematic diagram (Sheet 1 of 2)

1. Hydraulic Pump
2. Filter
3. Pressure Relief Valve
4. Three-Way Solenoid Valve
5. Pressure Switch
6. Hydraulic Fuse
7. Pedal Damper Assembly
8. Restrictor
9. Pressure Transmitter
10. Actuating Cylinder Assembly
11. Auxiliary Servo Assembly
12. Tail Rotor Servo Assembly
13. Reservoir
14. Quick Disconnects
15. Pressure Indicator
16. Servo Switch
17. Snubber

Figure 6–5. Auxiliary hydraulic system schematic diagram (Sheet 2 of 2)

Figure 6–6. Auxiliary hydraulic panel installed (helicopters serial No. prior to 56-4313)

Figure 6–7. Auxiliary hydraulic panel installed (helicopters serial No. 56-4313 and subsequent)

lic pump. From the hydraulic pump the hydraulic fluid is sent into the system or bypassed internally and returned to the reservoir. An overboard drain tube is provided. The hydraulic pump is mounted on the accessory section of the engine and is driven by an accessory drive. Access to the hydraulic pump is gained by opening the nose doors.

a. Removal. (1) Disconnect supply, pressure, and bypass hose assemblies on right side of accessory compartment shroud assembly.

(2) Disconnect bypass hose assembly at top of hydraulic pump.

(3) Disconnect pump drain tube from hydraulic pump.

(4) Disconnect supply and pressure hose assemblies from hydraulic pump.

(5) Remove nuts and washers securing hydraulic pump and cooling tube bracket on drive adapter on accessory section of engine. Remove cooling tube bracket, pump, and gasket.

Note

Do not remove drive shaft coupling from drive shaft inside drive adapter.

(6) Remove fittings from hydraulic pump.

b. Cleaning. Clean hydraulic pump with a clean, lint-free cloth moistened with solvent (item 4, table 1–8).

c. Inspection. (1) Inspect hydraulic pump for cracks, dents, and elongated mounting holes.

(2) Inspect fittings for stripped or malformed threads.

(3) Inspect drive shaft coupling for excessive wear.

d. Installation. (1) Install fittings in hydraulic pump.

(2) Check to see that drive shaft coupling is installed in end of drive shaft inside drive adapter on accessory section of engine. Position hydraulic pump and gasket on drive adapter with bypass port up. Position cooling tube bracket on upper left-hand stud. Secure hydraulic pump with washers and nuts.

Note

Short leg of bracket should be secured to stud and long leg should be pointing up and directly forward.

(3) Connect supply and pressure hose assemblies at rear of hydraulic pump.

(4) Connect pump drain tube beneath hydraulic pump.

(5) Connect reservoir bypass hose assembly at top of hydraulic pump.

(6) Connect supply, pressure, and bypass hose assemblies on right side of accessory compartment shroud assembly.

(7) Bleed auxiliary hydraulic system in accordance with paragraph 6–19.

6–21. *Reservoir (Helicopter Serial No. Prior to 56-4313).* The auxiliary hydraulic system reservoir (13, figure 6–5) is mounted on the auxiliary hydraulic panel (figure 6–6) in the clutch compartment. A sight level gage, inspection light, filler tube, and vent line are provided as well as the supply and return lines. Access to the reservoir may be gained by removing the clutch access door and the upper panel casing. On helicopters serial No. 54-2864 through 56-4312, a screen is installed in the left side of the cabin forward bulkhead to allow visual inspection of the reservoir sight gage from the cabin without necessitating removal of the clutch access door.

a. Reservoir filter removal. (1) Remove screws securing upper casing to bulkhead. Remove upper casing.

(2) Disconnect overboard vent tubing above reducer located on top of reservoir.

(3) Unscrew and remove adapter and gasket from reservoir.

(4) Remove retainer ring and filter element from adapter.

b. Inspection. (1) Inspect hydraulic reservoir filter for deterioration.

(2) Inspect filter for torn screen and for serviceability.

c. Reservoir filter installation. (1) Place a new filter element in adapter and install retainer ring.

(2) Install adapter and gasket in reservoir and connect overboard vent tubing to reducer.

(3) Position upper casing on bulkhead and secure with screws.

6–22. *Reservoir (Helicopters Serial No. 56-4313 and subsequent).* The reservoir (13, figure 6–5) for the auxiliary hydraulic system is mounted in the right-hand side of the transmission compartment on two supports which also serve as the auxiliary hydraulic panel. (See figure 6–7.) A sight level gage and a light bracket as well as openings for a drain and vent line, a bypass line, a supply line, and return lines are provided. Access to the reservoir is gained by hinging down the service platform on the right side of the helicopter.

a. Reservoir filter removal. Remove filter element in accordance with instructions outlined in paragraph 6–21*a*.

b. Inspection. Inspect reservoir filter element in accordance with paragraph 6–21*b*.

c. Reservoir filter installation. Install reservoir filter element in accordance with paragraph 6–21*c*.

6–23. *Filter.* The filter (2, figure 6–5) for the auxiliary hydraulic is mounted on the bulkhead in the clutch compartment and is the same type filter used in the primary hydraulic system. Access to the filter is gained by removing the clutch access door.

a. Removal. Refer to paragraph 6–11*a*.

b. Cleaning. Refer to paragraph 6–11*b*.

c. Inspection. Refer to paragraph 6–11*c*.

d. Installation. Refer to paragraph 6–11*d*.

6–24. *Three-Way Solenoid Valve.* The three-way solenoid valve (4, figure 6–5) for the auxiliary hydraulic system is the same as for the primary hydraulic system, except the location. On helicopters serial No. prior to 56-4313 the three-way solenoid valve is located on the auxiliary hydraulic panel (figure 6–6) located in the clutch compartment. On helicopters serial No. 56-4313 and subsequent the three-way solenoid valve is located on the auxiliary hydraulic panel (figure 6–7) located on the right side of the main transmission deck.

a. Removal. Refer to paragraph 6–14*a*.

b. Cleaning. Refer to paragraph 6–14*b*.

c. Inspection. Refer to paragraph 6–14*c*.

d. Installation. Refer to paragraph 6–14*d*.

6–25. *Pressure Switch.* The pressure switch (5, figure 6–5) for the auxiliary hydraulic system is the same as for the primary hydraulic system, except the location. On helicopters serial No. prior to 56-4313 the pressure switch is located on the auxiliary hydraulic panel (figure 6–6) located in the clutch compartment. On helicopters serial No. 56-4313 and subsequent the pressure switch is located on the auxiliary hydraulic panel (figure 6–7) located on the right side of the main transmission deck.

a. Removal. Refer to paragraph 6–10*a*.

b. Inspection. Refer to paragraph 6–10*b*.

c. Installation. Refer to paragraph 6–10*c*.

6–26. *Pressure Relief Valve.* The pressure relief valve (3, figure 6–5) for the auxiliary hydraulic system is the same as for the primary hydraulic system, except the location. On helicopters serial No. prior to 56-4313 the pressure relief valve is located on the auxiliary hydraulic panel (figure 6–6) located in the clutch compartment. On helicopters serial No. 56-4313 and sub-

sequent the pressure relief valve is located on the auxiliary hydraulic panel (figure 6–7) located on the right side of the main transmission deck.

a. Removal. Refer to paragraph 6–13*a*.

c. Cleaning. Refer to paragraph 6–13*b*.

c. Inspection. Refer to paragraph 6–13*c*.

d. Installation. Refer to paragraph 6–13*d*.

6–27. *Restrictor and Snubber.* The restrictor (8, figure 6–5) and snubber (17) for the auxiliary hydraulic system are the same as for the primary hydraulic system.

a. Removal. Refer to paragraph 6–16*a*.

b. Cleaning. Refer to paragraph 6–16*b*.

c. Inspection. Refer to paragraph 6–16*c*.

d. Installation. Refer to paragraph 6–16*d*.

6–28. *Pressure Transmitter.* The pressure transmitter (9, figure 6–5) for the auxiliary hydraulic system is the same as for the primary hydraulic system, except for location. The pressure transmitter is located on the right side of the main transmission deck.

a. Removal. Refer to paragraph 6–15*a*.

b. Cleaning. Refer to paragraph 6–15*b*.

c. Inspection. Refer to paragraph 6–15*c*.

d. Installation. Refer to paragraph 6–15*d*.

6–29. *Actuating Cylinder Assembly.* The actuating cylinder assembly (10, figure 6–5) is located on the right side of the auxiliary servo assembly (11) and is attached to a support on the main transmission at the aft end and a lever of the auxiliary servo assembly at the forward end. When the auxiliary hydraulic system is shut off, or when pressure in the system drops below 1000 psi, the actuating cylinder assembly turns a shaft in the auxiliary servo assembly to bypass hydraulic fluid pressure around the servo cylinders and rotates the auxiliary servo assembly cam and roller to the manual position. Access to the actuating cylinder assembly is gained by removing the cover from over the auxiliary servo assembly in the pilots' compartment and hinging down the service platform on the right side of the helicopter.

a. Cleaning. Clean actuating cylinder assembly with a clean, lint-free cloth moistened with solvent (item 4, table 1–8).

b. Inspection. Inspect actuating cylinder assembly for crack, dents, corrosion, and security of attachment.

6–30. *Hydraulic Lines, Fittings, and Clamps.* There are two types of hydraulic lines used in the auxiliary hydraulic system, rigid aluminum alloy tube assemblies and flexible hose assemblies. The hydraulic lines use conventional fittings and clamps and can be removed or installed easily with common tools.

a. Removal. (1) Hinge down service platform on each side of main transmission and remove access covers and plates, as necessary, to gain access to hydraulic lines, fittings, and clamps.

(2) Remove attaching hardware and remove clamps from tube or hose assemblies to be removed.

(3) Disconnect tube or hose assemblies from other tube or hose assemblies or hydraulic components, and remove tube or hose assemblies.

(4) Cap open ends of tube or hose assemblies and all open ports of hydraulic components left installed to prevent entry of foreign matter into auxiliary hydraulic system.

(5) Remove fittings (elbows or nipples) installed in fuselage structure by first noting position of fittings. Remove nuts and washers and remove fittings from fuselage structure.

b. Inspection. (1) Inspect tube assemblies for cracks and dents and end fittings for malformed threads.

(2) Inspect hose assemblies for fraying and deterioration and end fittings for malformed threads.

(3) Inspect fittings (elbows or nipples) for cracks, dents, and malformed threads.

c. Installation. (1) Position fittings (elbows or nipples) in fuselage structure as noted at time of removal and secure with washers and nuts.

(2) Remove caps from ends of tube or hose assemblies and ports of hydraulic components. Blow tube or hose assemblies clear with dry, filtered compressed air.

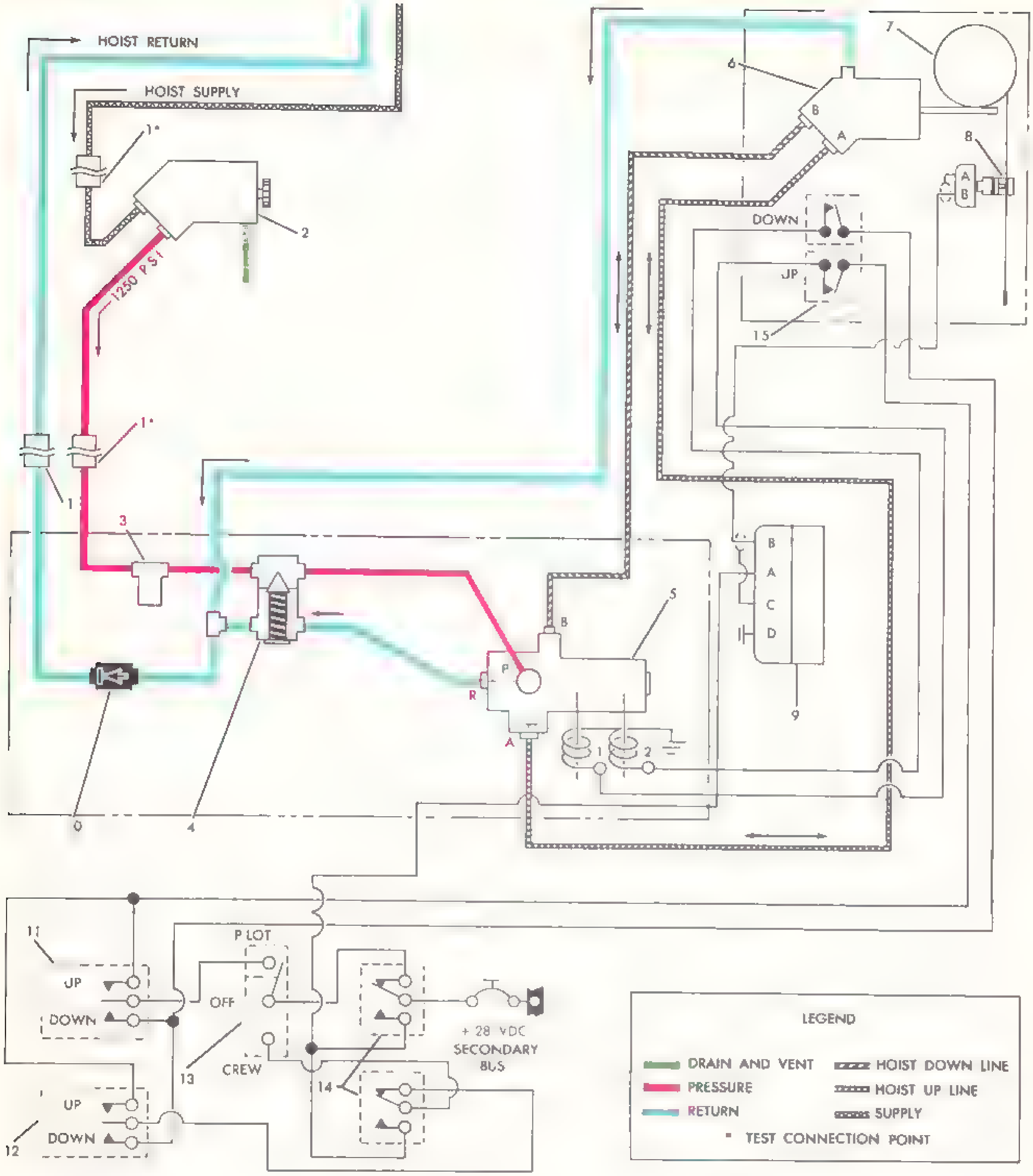
(3) Place tube or hose assemblies in their respective positions and connect to other tube or hose assemblies or hydraulic components.

(4) Position clamps on tube or hose assemblies and secure with attaching hardware.

(5) Bleed auxiliary hydraulic system in accordance with paragraph 6–19 and service reservoir in accordance with table 1–5.

(6) Install access covers and plates and close service platforms.

6–31. Rescue Hoist Hydraulic System. The rescue hoist hydraulic system consists of a hydraulic pump (2, figure 6–8), filter (3), relief valve (4), four-way valve (5), check valve (10), and hydraulic lines, fitting, and clamps. All hydraulic components of the rescue hoist hydraulic system are mounted on a bracket on the main transmission deck, except the hydraulic pump. Hydraulic fluid for the rescue hoist hydraulic system is drawn from the reservoir of the primary hydraulic system.



1. Quick Disconnect
2. Hydraulic Pump
3. Filter
4. Relief Valve
5. Four-Way Valve
6. Hydraulic Motor
7. Winch
8. Guillotine
9. Circuit Tester
10. Check Valve
11. Pilot's Hoist Switch
12. Crew's Hoist Switch
13. Master Hoist Switch
14. Emergency Cable Cut-Off Switches
15. Hoist Limit Switches

Figure 6-8. Rescue hoist hydraulic system schematic diagram

6–32. Hydraulic Pump. The hydraulic pump (2, figure 6–8) is located on the left side of the lower housing of the main transmission, forward of the primary hydraulic system hydraulic pump, and is driven by an accessory drive of the main transmission. Hydraulic fluid is supplied to the hydraulic pump from the primary hydraulic system reservoir. The hydraulic pump is of the constant-displacement type and provides the system with a nonpulsating flow of fluid at 1250 psi. The displacement of the pump is 0.367 cubic inch-per-revolution. Access to the hydraulic pump is gained by hinging down the service platform on the left side of the helicopter.

a. Removal. (1) Disconnect reservoir supply line, pressure line, and overboard drain line from hydraulic pump (2, figure 6–8).

(2) Remove nuts and washers securing hydraulic pump (2) on studs in main transmission. Remove hydraulic pump and gasket.

(3) Remove fittings from ports of hydraulic pump.

Note

If hydraulic pump (2) is not replaced immediately, install gasket and protective cover on main transmission mounting pad.

b. Cleaning. Clean hydraulic pump with a clean cloth slightly moistened in solvent (item 4, table 1–8).

c. Inspection. (1) Inspect hydraulic pump for visible signs of leakage.

(2) Inspect threaded fittings and ports for stripped or malformed threads.

d. Installation. (1) Install fittings in hydraulic pump (2, figure 6–8).

Note

Hydraulic pump must be completely filled with hydraulic fluid (item 3, table 1–8) at time of installation.

(2) Position gasket and hydraulic pump (2) on studs of main transmission and secure in place with washers and nuts.

(3) Connect overboard drain line, pressure line, and reservoir supply line to hydraulic pump (2).

6–33. Filter. The filter (3, figure 6–8) is located on the bracket of the hydraulic panel for the rescue hoist hydraulic system mounted on the left side of the main transmission deck. The filter has a rated capacity of 6 gpm and removes impurities from the hydraulic fluid before it can enter the hydraulic components.

a. Removal. (1) Disconnect pressure line from each side of filter (3, figure 6–8).

(2) Remove bolts, washers, and nuts securing filter (3) to bracket of hydraulic panel and remove filter.

(3) Remove elbow and nipple from filter.

(4) Remove filter bowl from filter body and remove filter element from filter bowl.

b. Cleaning. Clean filter with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect filter for cracks, dents, and malformed threads.

d. Installation. (1) Place filter element in filter bowl and install filter bowl on filter body.

(2) Install elbow and nipple in filter.

(3) Position filter on bracket of hydraulic panel and secure with bolts, washers, and nuts.

(4) Connect pressure line to each side of filter.

6–34. Relief Valve. The relief valve (4, figure 6–8) is located at the aft end of the hydraulic panel. The check valve (10) is installed in the tee installed in the relief valve. The relief valve will open and bypass hydraulic fluid to the reservoir when the pressure in the rescue hoist hydraulic system reaches 1250 psi and has a rated flow of 6 gpm.

a. Removal. (1) Disconnect tube assembly (1, figure 4–18) from tee in relief valve (20) and hose assembly (3) from check valve (2).

(2) Disconnect tube assemblies (13 and 17) from right side of relief valve (20) and tube assembly routed from filter (4) from left side of relief valve.

(3) Remove bolts, washers, and spacers and remove relief valve (20) from bracket (16).

(4) Remove check valve (2) and tee from relief valve (20).

b. Cleaning. Clean relief valve with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect relief valve for cracks, dents, and malformed threads.

d. Installation. (1) Install tee in relief valve (20, figure 4–18) and install check valve (2) in tee.

(2) Position relief valve (20) on bracket (16) with spacers and secure with bolts and washers.

(3) Connect tube assemblies (13 and 17) to right side of relief valve (20) and connect tube assembly routed from filter (4) to left side of relief valve.

(4) Connect tube assembly (1) to tee in relief valve and hose assembly (3) to check valve (2).

6–35. Four-Way Valve. The four-way valve (5, figure 6–8) is located on the forward end of the bracket of the hydraulic panel for the rescue hoist hydraulic system. The purpose of the four-way valve is to control the direction of rotation of the hydraulic motor (6) of winch (7). The operation of the four-way valve is governed by two solenoids, mounted on the four-way valve,

which control the movement of the directional spool within the four-way valve. The four-way valve has a rated capacity of 3 gpm and a proof pressure of 2250 psi.

a. Removal. (1) Disconnect electrical cables (6 and 7, figure 4–18) from solenoids (8).

(2) Disconnect tube assemblies (9, 13, 15, and 17) from four-way valve (14).

(3) Remove bolts and washers and remove four-way valve (14), with solenoids (8) attached, from bracket (16).

(4) Remove elbows and nipples from four-way valve (14).

b. Cleaning. Clean four-way valve with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect four-way valve for cracks, dents, and malformed threads.

d. Installation. (1) Install nipples and elbows in four-way valve (14, figure 4–18).

(2) Position four-way valve (14), with solenoids (8) attached, on bracket (16) and secure with washers and nuts.

(3) Connect tube assemblies (9, 13, 15, and 17) to four-way valve (14).

(4) Connect electrical cables (6 and 7) to solenoids (8).

6–36. *Check Valve.* Check valve (10, figure 6–8) is installed in a tee on the left side of relief valve (4). The check valve is installed to direct the flow of hydraulic fluid in one direction only.

a. Removal. (1) Disconnect hose assembly (3, figure 4–18) from check valve (2).

(2) Remove check valve (2) from tee installed in relief valve (20).

b. Cleaning. Clean check valve with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect check valve for cracks, dents, and malformed threads.

d. Installation. (1) Install check valve (2, figure 4–18) in tee installed in relief valve (20).

(2) Connect hose assembly (3) to check valve (2).

6–37. *Hydraulic Lines, Fittings, and Clamps.* There are two types of hydraulic lines used in the rescue hoist hydraulic system, rigid aluminum alloy tube assemblies and flexible hose assemblies. The hydraulic lines use conventional fittings and clamps and can be removed or installed easily with common tools.

a. Removal. (1) Hinge down service platform on each side of main transmission and remove access covers and plates, as necessary, to gain access to hydraulic lines, fittings, and clamps.

(2) Remove attaching hardware and remove clamps from tube or hose assemblies to be removed.

(3) Disconnect tube or hose assemblies from other tube or hose assemblies or hydraulic components, and remove tube or hose assemblies.

(4) Cap open ends of tube or hose assemblies and all open ports of hydraulic components left installed to prevent entry of foreign matter into rescue hoist hydraulic system.

(5) Remove fittings (elbows or nipples) installed in fuselage structure by first noting position of fitting. Remove nuts and washers and remove fittings from fuselage structure.

b. Inspection. (1) Inspect tube assemblies for cracks and dents and end fittings for malformed threads.

(2) Inspect hose assemblies for fraying and deterioration and end fittings for malformed threads.

(3) Inspect fittings (elbows or nipples) for cracks, dents, and malformed threads.

c. Installation. (1) Position fittings (elbows or nipples) in fuselage structure as noted at time of removal and secure with washers and nuts.

(2) Remove caps from ends of tube or hose assemblies and ports of hydraulic components. Blow tube or hose assemblies clear with dry, filtered compressed air.

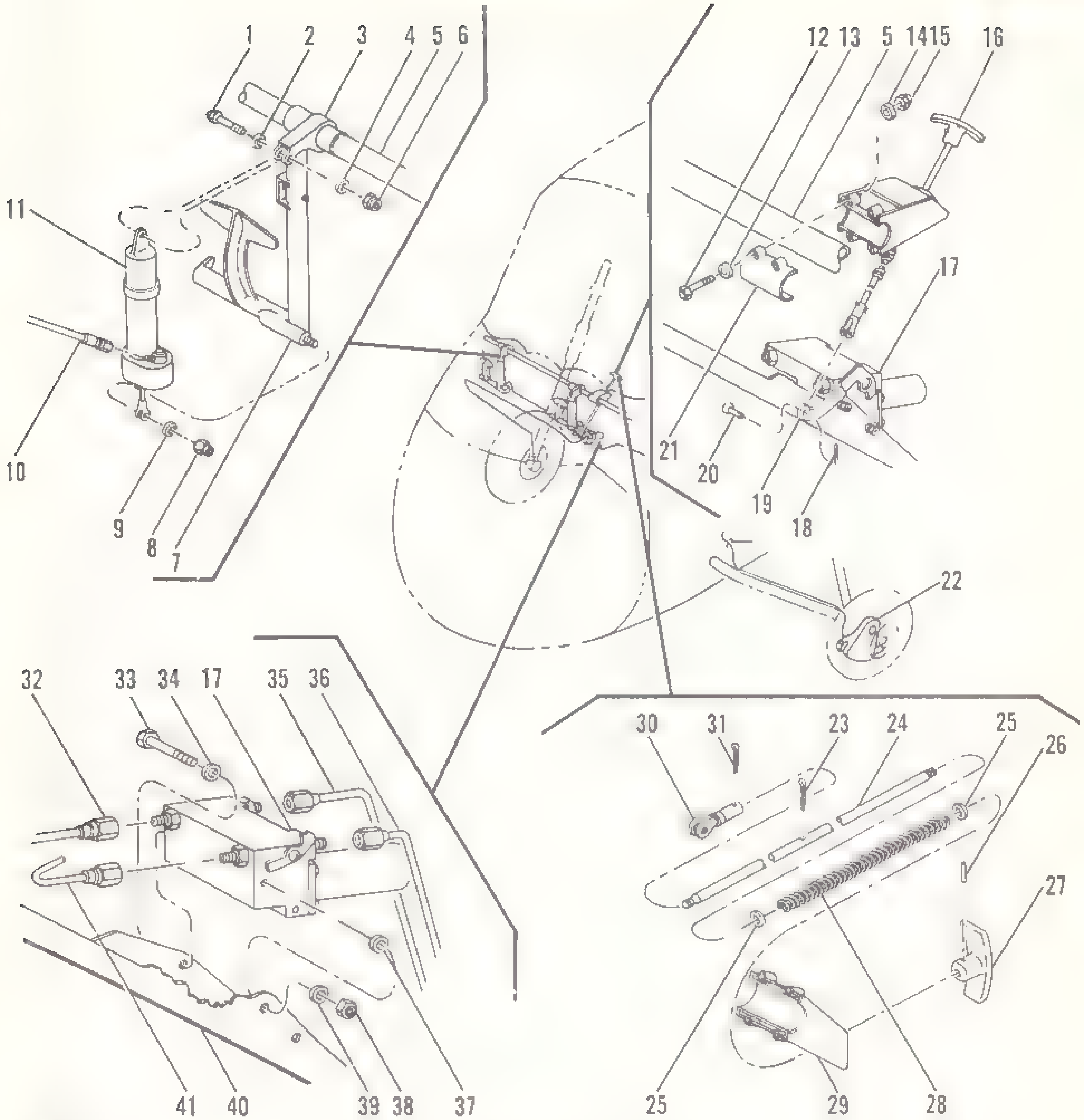
(3) Place tube or hose assemblies in their respective positions and connect to other tube or hose assemblies or hydraulic components.

(4) Position clamps on tube or hose assemblies and secure with attaching hardware.

(5) Install access covers and plates and close service platforms.

6–38. Wheel Brake Hydraulic System. The wheel brake hydraulic system consists of two brake cylinders (11, figure 6–9), parking brake valve (17), parking brake control assembly (16), wheel brake assembly (22), and hydraulic lines, fittings, and clamps. The brakes are applied by applying pressure to the toe plates on the pilot's control pedals (7). For maintenance of the brake assembly, refer to paragraph 4–77.

6–39. *Troubleshooting.* For troubleshooting procedures for the wheel brake hydraulic system, proceed as follows:



1. Bolt
2. Washer
3. Arm
4. Washer
5. Support
6. Nut
7. Pilot's Control Pedal
8. Nut
9. Washer
10. Hose Assembly
11. Brake Cylinder
12. Bolt
13. Washer
14. Washer
15. Nut
16. Parking Brake Control Assembly
17. Parking Brake Valve
18. Cotter Pin
19. Lever
20. Pin
21. Clamp
22. Wheel Brake Assembly
23. Cotter Pin
24. Rod
25. Washer
26. Pin
27. Handle
28. Spring
29. Bracket
30. Clevis
31. Pin
32. Tube Assembly
33. Bolt
34. Washer
35. Tube Assembly
36. Tube Assembly
37. Washer
38. Nut
39. Washer
40. Bracket
41. Tube Assembly

Figure 6—9. Wheel brake hydraulic system

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Brakes spongy or do not hold	Air in system	Bleed and fill system. (Refer to paragraph 6–40.)
	Lack of hydraulic fluid	Bleed and fill system. (Refer to paragraph 6–40.)
	Internal leakage in brake cylinder	Replace brake cylinder. (Refer to paragraphs 6–41*a* and *e*.)
	Worn wheel brake assembly	Replace wheel brake assembly. (Refer to paragraphs 4–77*a* and *d*.)
Parking brake does not hold; brakes hold when toe plates are depressed	Internal leakage in parking brake valve	Replace parking brake valve. (Refer to paragraphs 6–42*a* and *d*.)
Unusual loss of hydraulic fluid	Leakage in system	Visually check systems for leaks, correcting as necessary.

6–40. *Bleeding.* Bleed each side of wheel brake hydraulic system as follows:

a. Connect hose assembly from a pressure bleeder tank to check valve at wheel brake assembly.

b. Remove filler plug from brake cylinder and insert a transparent overflow line in filler opening and other end of overflow line into a container.

c. Open bleeder plug at top of wheel brake assembly.

d. Allow hydraulic fluid (item 3, table 1–8) from pressure bleeder tank to flow through wheel brake assembly until hydraulic fluid coming from bleeder plug has no air bubbles.

e. Close bleeder plug at top of wheel brake assembly.

f. Allow hydraulic fluid from pressure bleeder tank to flow through system until hydraulic fluid coming out of overflow line in brake cylinder has no air bubbles.

g. Remove overflow line from filler opening of brake cylinder and install filler plug.

h. Disconnect hose assembly of pressure bleeder tank from check valve.

6–41. *Brake Cylinders.* One brake cylinder (11, figure 6–9) is attached to each pilot's control pedal (7) and arm (3) on support (5). Depressing the toe plate on each pilot's control pedal actuates the piston in the brake cylinder and forces hydraulic fluid under pressure through the hydraulic lines, actuating the wheel brake assembly (22) at each main wheel.

a. Removal. (1) Disconnect hose assembly (10, figure 6–9) from each brake cylinder (11) and cap end of hose assembly.

(2) Remove bolt (1), washers (2 and 4), and nut (6) securing upper end of brake cylinder (11) to arm (3).

(3) Remove nut (8) and washer (9) securing lower end of brake cylinder (11) to pilot's control pedal (7).

(4) Remove brake cylinder (11) from aircraft. Remove filler plug and drain hydraulic fluid from brake cylinder. Install filler plug.

b. Testing. (1) Fill brake cylinder with hydraulic fluid (item 3, table 1–8).

(2) Insert plug gage into outlet port of brake cylinder.

(3) Pull on rod-end fitting until pressure of 1000 psi is noted on plug gage.

(4) Inspect brake cylinder for any signs of leakage. If leakage occurs, replace brake cylinder.

c. Cleaning. Clean brake cylinder with solvent (item 4, table 1–8) and dry with filtered compressed air.

d. Inspection. Inspect brake cylinder for cracks, dents, and elongated mounting holes.

e. Installation. (1) Position upper end of brake cylinder (11, figure 6–9) on arm (3) and secure with bolt (1), washers (2 and 4), and nut (6).

(2) Position lower end of brake cylinder (11) on pilot's control pedal (7) and secure with washer (9) and nut (8).

(3) Connect hose assembly (10) to brake cylinder (11).

(4) Bleed and fill wheel brake hydraulic system in accordance with paragraph 6–40.

6–42. *Parking Brake Valve.* The parking brake valve (17, figure 6–9) is mounted on a bracket just forward of the copilot's right control pedal. The function of the parking brake valve is to lock hydraulic fluid under pressure in the hydraulic lines leading to the wheel brake assembly (22) at each main wheel. The parking brake valve is operated by depressing the toe plates on the pilot's control pedals and pulling out on the handle of the parking brake control assembly (16). To release

the parking brake valve apply pressure to both pilot's control pedals or pilot's right control pedal only and push in on the handle of the parking brake control assembly. The parking brake valve incorporates a dual temperature compensator which provides for independent wheel brake assembly operation.

a. Removal. (1) Remove cotter pin (18, figure 6–9) and pin (20) securing clevis (30) on lever (19) of parking brake valve (17).

(2) Disconnect tube assemblies (32, 35, 36, and 41) from parking brake valve (17). Cap ends of tube assemblies.

(3) Remove bolts (33), washers (34, 37, and 39) and nuts (38) securing parking brake valve on bracket (40).

(4) Remove parking brake valve (17) from bracket (40) and cap open ports of parking brake valve.

b. Cleaning. Clean parking brake valve with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. (1) Inspect parking brake valve for crack, dents, and malformed threads.

(2) Inspect lever on parking brake valve for cracks, bends, and security of attachment.

d. Installation. (1) Position parking brake valve (17, figure 6–9) on bracket (40) and secure with bolts (33), washers (34, 37, and 39) and nuts (38). Remove caps from ports of parking brake valve.

(2) Remove caps from tube assemblies (32, 35, 36, and 41) and connect tube assemblies to parking brake valve (17).

(3) Position clevis (30) on lever (19) and secure with pin (20) and cotter pin (18).

(4) Bleed and fill wheel brake hydraulic system in accordance with paragraph 6–40.

6–43. Parking Brake Control Assembly. The parking brake control assembly (16, figure 6–9) is mounted on the support (5) of the control pedals below the instrument panel. The parking brake control assembly consists of a handle (27), rod (24), spring (28), clevis (30), bracket (29), and clamp (21).

a. Removal. (1) Remove cotter pin (18, figure 6–9) and pin (20) securing clevis (30) on lower end of parking brake control assembly (16) to lever (19) of parking brake valve (17).

(2) Remove bolts (12), washers (13 and 14), and nuts (15) securing clamp (21) and bracket (29) on support (5).

(3) Remove clamp (21) and parking brake control assembly (16) from support (5).

(4) Remove pin (26) and remove handle (27) from rod (24).

(5) Pull rod (24) from bracket (29) and remove washers (25), spring (28), and cotter pin (23) from rod.

(6) Remove pin (31) securing clevis (30) on rod (24) and remove clevis from rod.

b. Cleaning. Clean parking brake control assembly with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. (1) Inspect all components of parking brake control assembly for cracks, bends, and corrosion.

(2) Inspect clevis, rod, and handle for malformed threads.

d. Installation. (1) Install clevis (30, figure 6–9) on rod (24) and secure with pin (31).

(2) Install cotter pin (23) in rod (24) and position washers (25) and spring (28) on rod.

(3) Insert end of rod (24) through bracket (29) and install handle (27) on end of rod. Secure handle with pin (26).

(4) Position parking brake control assembly (16) and clamp (21) on support (5). Secure clamp and bracket (29) on support with bolts (12), washers (13 and 14), and nuts (15).

(5) Position clevis (30) on lever (19) and secure with pin (20) and cotter pin (18).

6–44. Hydraulic Lines, Fittings, and Clamps. There are two types of hydraulic lines used in the wheel brake hydraulic system, rigid aluminum alloy tube assemblies and flexible hose assemblies. The hydraulic lines use conventional fittings and clamps and can be removed or installed easily with common tools.

a. Removal. (1) Remove access covers and plates, as necessary, to gain access to hydraulic lines, fittings, and clamps.

(2) Remove attaching hardware and remove clamps from tube or hose assemblies to be removed.

(3) Disconnect tube or hose assemblies from other tube or hose assemblies or hydraulic components and remove tube or hose assemblies.

(4) Cap open ends of tube or hose assemblies and all open ports of hydraulic components left installed to prevent entry of foreign matter into wheel brake hydraulic system.

(5) Remove fittings (elbows or nipples) installed in fuselage structure by first noting position of fittings. Remove nuts and washers and remove fittings from fuselage structure.

b. Inspection. (1) Inspect tube assemblies for cracks and dents and end fittings for malformed threads.

(2) Inspect hose assemblies for fraying and deterioration and end fittings for malformed threads.

(3) Inspect fittings (elbows or nipples) for cracks, dents, and malformed threads.

c. Installation. (1) Position fittings (elbows or nipples) in fuselage structure as noted at time of removal and secure with washers and nuts.

(2) Remove caps from ends of tube or hose assemblies and ports of hydraulic components. Blow tube or hose assemblies clear with dry, filtered compressed air.

(3) Place tube or hose assemblies in their respective positions and connect to other tube or hose assemblies or hydraulic components.

(4) Position clamps on tube or hose assemblies and secure with attaching hardware.

(5) Bleed and fill wheel brake hydraulic system in accordance with paragraph 6–40.

(6) Install access covers and plates.

6–45. Rotor Brake Hydraulic System.

The rotor brake hydraulic system (figure 6–10 or 6–11) is a nonpressurized hydraulic system for stopping the main rotor from turning and preventing the main and tail rotors from windmilling. The rotor brake hydraulic system consists of a master cylinder, accumulator, relief valve, rotor brake assembly, and hydraulic lines, fittings and clamps. On model CH-34C a pressure switch and check valve have been installed. For main-

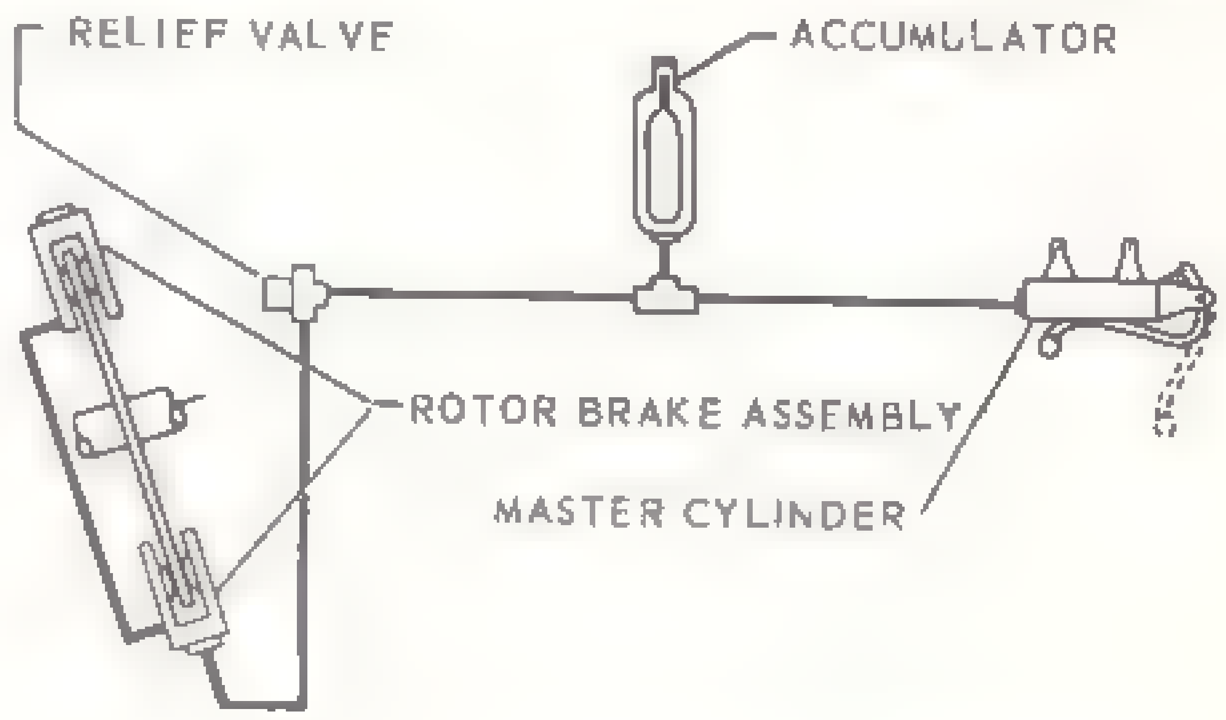


Figure 6–10. Rotor brake hydraulic system schematic diagram (model CH-34A)

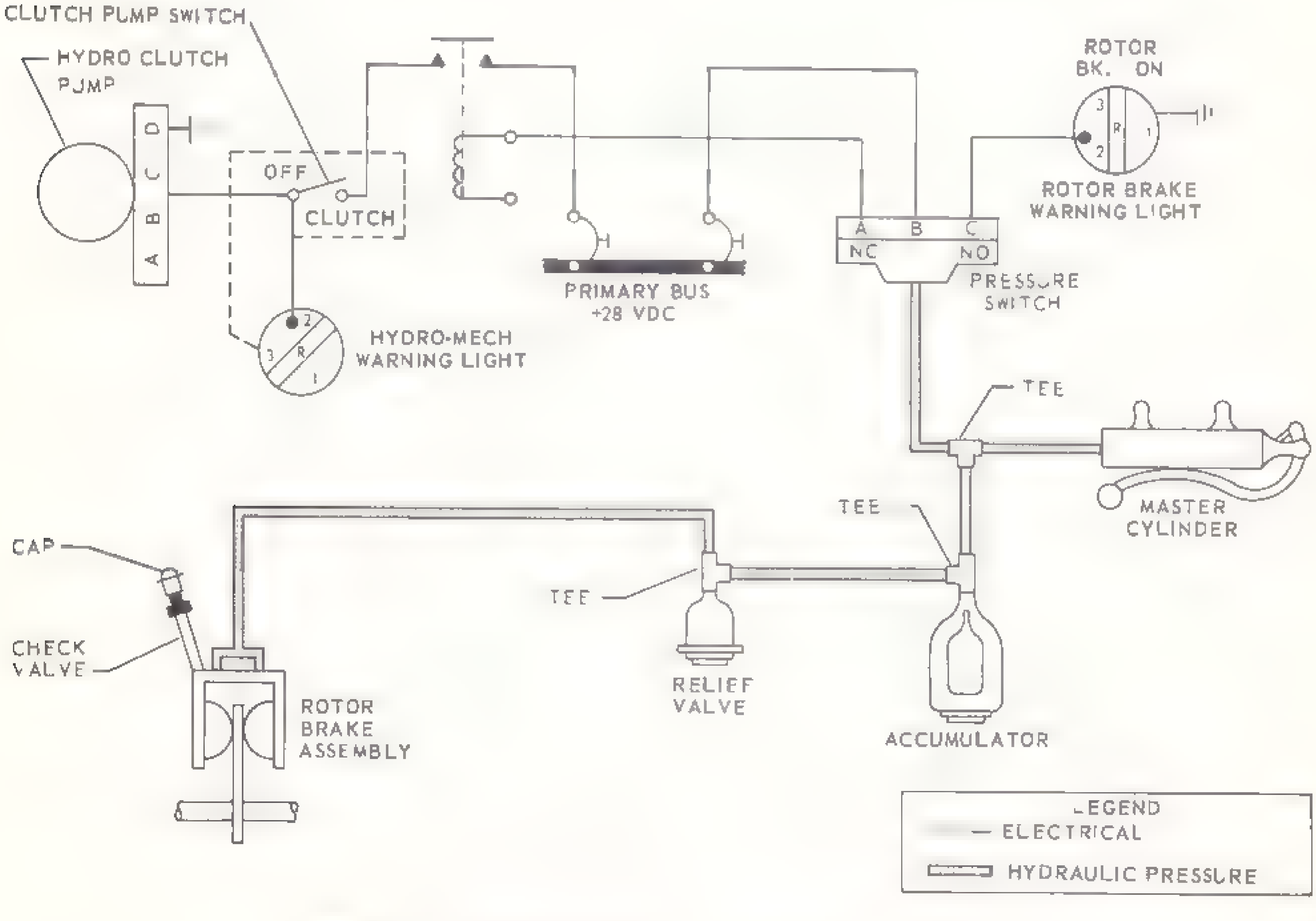


Figure 6–11. Rotor brake hydraulic system schematic diagram (model CH-34C)

tenance of the rotor brake assembly, refer to paragraph 7–60 and for the pressure switch, refer to paragraphs 10–149 through 10–154.

6–46. *Troubleshooting.* For troubleshooting procedures for the rotor brake hydraulic system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Brake does not hold	Low hydraulic fluid level	Service master cylinder with hydraulic fluid. (Refer to paragraph 6–47 or 6–48.)
	Low air pressure in accumulator	Service accumulator with air. (Refer to paragraph 6–50*e*.)
	Leakage in hydraulic lines	Check lines for leaks, especially at flares and connections; replace defective hydraulic lines. (Refer to paragraphs 6–53*a* and *c*.)
	Internal or external leakage in master cylinder	Replace master cylinder. (Refer to paragraphs 6–49*a* and *d*.)
	Internal or external leakage in brake half	Replace brake half. (Refer to paragraphs 7–60*b* and *e*.)
	Leakage in accumulator, especially at air valve	Replace accumulator. (Refer to paragraphs 6–50*a* and *d*.)
	Excessively worn brake lining	Replace brake lining. (Notify direct support maintenance unit.)
	Leaking accumulator piston seals	Replace accumulator. (Refer to paragraphs 6–50*a* and *d*.)
Spongy brake	Air in hydraulic lines	Bleed system. (Refer to paragraph 6–47 or 6–48.)
	Clogged vent plug screen in rotor brake valve reservoir.	Replace screen. (Notify direct support maintenance unit.)
Brake disc scored	Uneven brake wear	Reshim brake half and replace lining. (Refer to paragraph 7–60*b* and *e*.) Replace disc if scored beyond a minimum thickness of 0.366 inch at any point. (Notify direct support maintenance unit.)
Scraping noise from rotor brake or evidence of brake contact with rotor brake off	Brake not disengaging because of sticking brake half	Replace malfunctioning brake half. (Refer to paragraphs 7–60*b* and e.)
	Insufficient clearance between brake and disc	Adjust clearance. (Refer to paragraph 7–60*f*.)
	Relief valve malfunctioning	Replace relief valve. (Refer to paragraphs 6–51*a* and *d*.)
Excessive foaming or overflow on master cylinder	Clogged vent plug screen	Replace screen. (Notify direct support maintenance unit.

6–47. *Filling and Bleeding with Pressure Bleeding Equipment.* *a.* Make sure that pressure accumulator is charged as specified in table 6–1.

b. Connect a line from pressure bleeding equipment to check valve at rotor brake assembly.

Note

Outlet pressure of pressure bleeding equipment is to be just the amount necessary to maintain a flow of hydraulic fluid for each bleeding operation.

Table 6–1. Temperature corrected accumulator precharge pressure

TEMPERATURE RANGE (°F)			TEMPERATURE RANGE (°C)			*PRESSURE RANGE (PSI)		
−65	to	−21	−54	to	−30	210 (minimum pressure)		
−20		−6	−29		−21	210	to	215
−5		+4	−20		−16	215		220
+5		+14	−15		−10	220		225
+15		+24	−9		−5	225		230
+25		+34	−4		+1	230		235
+35		+44	+2		+6	235		240
+45		+59	+7		+15	240		245
+60		+69	+16		+20	245		250
+70		+79	+21		+26	250		255
+80		+89	+27		+31	255		260
+90		+99	+32		+37	260		265
+100		+109	+38		+43	265		270
+110		+119	+44		+48	270		275
+120		+160	+49		+71	275 (maximum pressure)		

Note

This table is for ambient temperatures with the air in the accumulator and the hydraulic fluid in the system at the ambient temperature. Do not precharge accumulator or check the precharge until a suitable period of time has elapsed after the helicopter has been moved to an area of different temperature.

*The desired pressure ranges are listed in this table. A variation to the nearest increment of 5 is permissible.

c. Cut lock wire securing filler and bleeder plugs on master cylinder. Remove filler plug and connect overflow line. Place free end of overflow line in a receptacle. Place brake handle in full detent or OFF position, and pump hydraulic fluid (item 3, table 1–8) from pressure bleeding equipment until a pint of fluid flows from overflow line with no indication of air bubbles.

d. Place brake handle in full ON position. Place receptacle beneath master cylinder bleeder plug. While pumping fluid into system, loosen bleeder plug and check flow of fluid until there is no indication of air bubbles; then tighten bleeder plug and stop pumping.

e. Keep brake handle in full ON position, bleeding each of four brake halves in following order:

(1) Left aft.

(2) Right aft.

(3) Left forward.

(4) Right forward.

f. Remove bleeder screw from bleeder valve on rotor brake half, connect a transparent overflow line to bleeder valve, and set free end in a receptacle. Loosen bleeder valve while pumping hydraulic fluid and check until there is no indication of air bubbles. Tighten bleeder valve and replace bleeder screw. Repeat this operation for each of four brake halves.

g. Operate brake handle to check for evidence of air in system.

h. Remove overflow line from filler plug hole and replace filler plug; then remove line of pressure bleeding equipment from check valve at rotor brake assembly.

i. Return hydraulic fluid level to normal by moving brake handle slightly forward; then loosen bleeder plug, allowing hydraulic fluid to flow out while maintaining forward travel of brake handle. Close bleeder plug before brake handle reaches full ON position; then return brake handle to OFF or full detent position. Repeat complete procedure until normal level is reached.

Caution

The bleeder plug must always be tightened before the brake handle reaches the full ON position. If not, the entire bleeding procedure must be repeated.

j. Secure bleeder plug to filler plug with lock wire on master cylinder.

6–48. *Filling and Bleeding Without Pressure Bleeding Equipment. a.* Check accumulator to make certain that pressure is as specified in table 6–1.

b. Cut lock wire securing filler and bleeder plugs to master cylinder. Place brake handle in full detent or OFF position, and fill master cylinder with hydraulic fluid (item 3, table 1–8) to normal level and reinstall filler plug.

c. Remove four bleeder screws, loosen one bleeder valve on one brake half, and push brake handle forward. Before brake handle reaches full ON position, tighten bleeder valve; then pull brake handle to full detent or OFF position, and refill master cylinder. Repeat this procedure until brake halves are filled with hydraulic fluid. Refill master cylinder.

d. Loosen bleeder plug on master cylinder.

e. Holding a suitable container under bleeder plug, move brake handle toward ON position, causing hydraulic fluid to flow out of bleeder plug.

f. Tighten bleeder plug before brake handle reaches full ON position.

Caution

The bleeder plug must be tightened before the brake handle reaches the full ON position.

g. Repeat steps *e* and *f* until fluid flowing from bleeder plug is free of air bubbles.

Caution

Hydraulic fluid level must be maintained. If not, entire bleeding procedure must be repeated.

h. Loosen bleeder valve on one of the four brake halves. Operate brake handle as outlined in steps *f* and *g* to bleed any trapped air out of one brake half, but loosen and tighten bleeder plug on master cylinder.

i. Repeat step *h* for each of the other three brake halves.

j. Repeat procedure outlined in steps *d* through *g* to bleed any air that might have worked back through lines into master cylinder.

k. Secure filler plug and bleeder plug on master cylinder with lock wire.

Warning

Do not pump master cylinder to make it firm, as this will only deflect the support.

6–49. *Master Cylinder.* The master cylinder (figure 6–12) for the rotor brake hydraulic system is mounted on the ceiling of the pilots' compartment. The brake handle attached to the aft of the master cylinder moves down and up causing hydraulic fluid pressure to actuate the rotor brake assembly. The brake handle may be locked in the UP or DOWN position.

a. Removal. (1) Disconnect hose assembly from elbow in aft end of master cylinder and cap end of hose assembly.

(2) Remove bolts, washers, and nuts securing master cylinder to ceiling of pilots' compartment. Remove master cylinder and spacer.

(3) Loosen nut on elbow in aft end of master cylinder and remove elbow. Cap port of master cylinder.

b. Cleaning. Clean master cylinder with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect master cylinder for cracks, dents, bends, and elongated mounting holes.

d. Installation. (1) Remove cap from port of master cylinder and install elbow. Tighten nut on elbow to secure elbow in position.

(2) Position master cylinder and spacer on ceiling of pilots' compartment. Secure master cylinder in position with bolts, washers, and nuts.

(3) Remove cap from hose assembly and connect to elbow in aft end of master cylinder.

(4) Bleed rotor brake hydraulic system in accordance with paragraph 6–47 or 6–48.

Note

Check brake handle for retention in UP position by jarring master cylinder and its surrounding structure. If brake handle jars loose, replace master cylinder.

6–50. *Accumulator.* The accumulator (figure 6–13) is mounted on the right side of the pilots' compartment

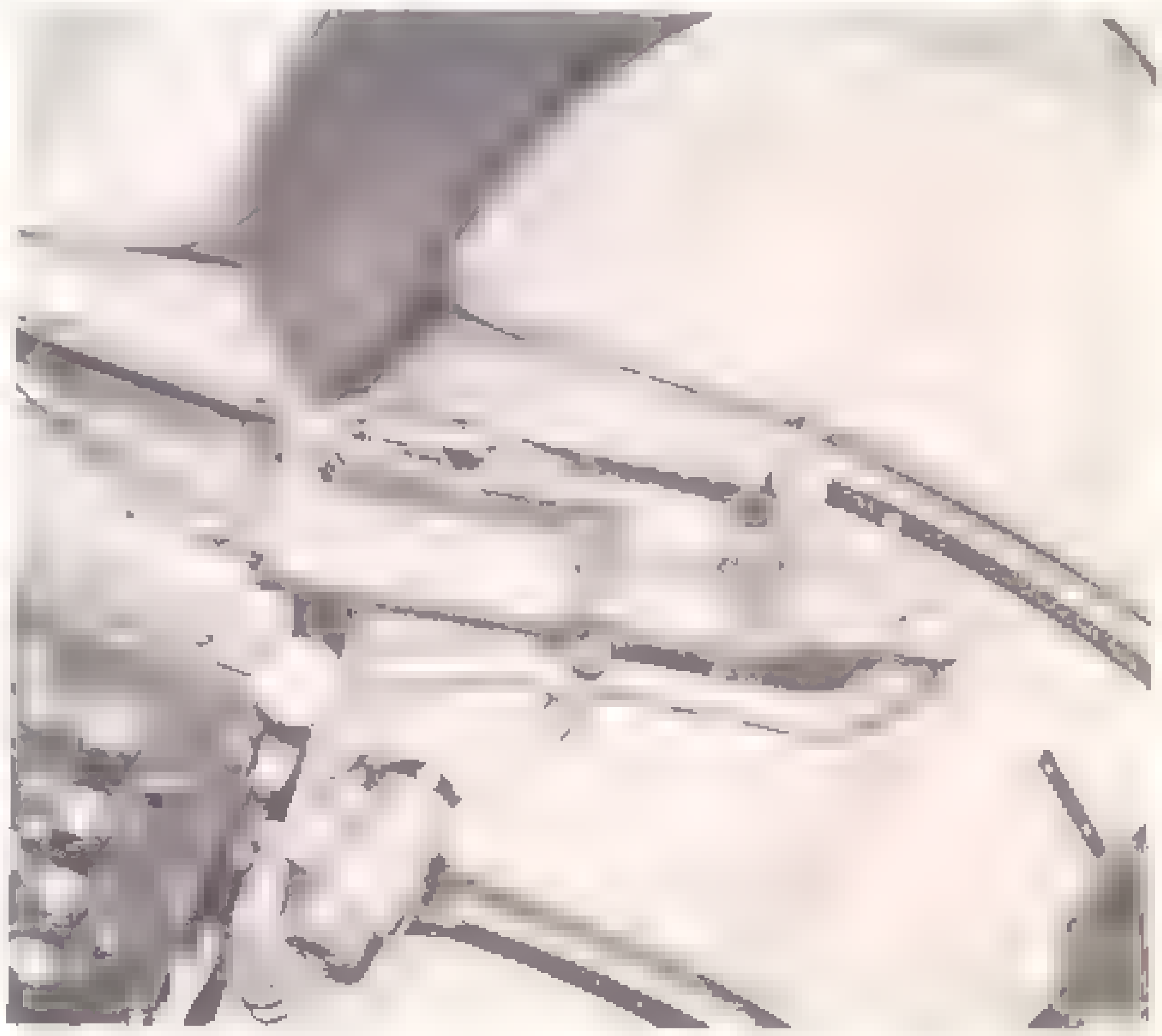


Figure 6–12. Master cylinder installed

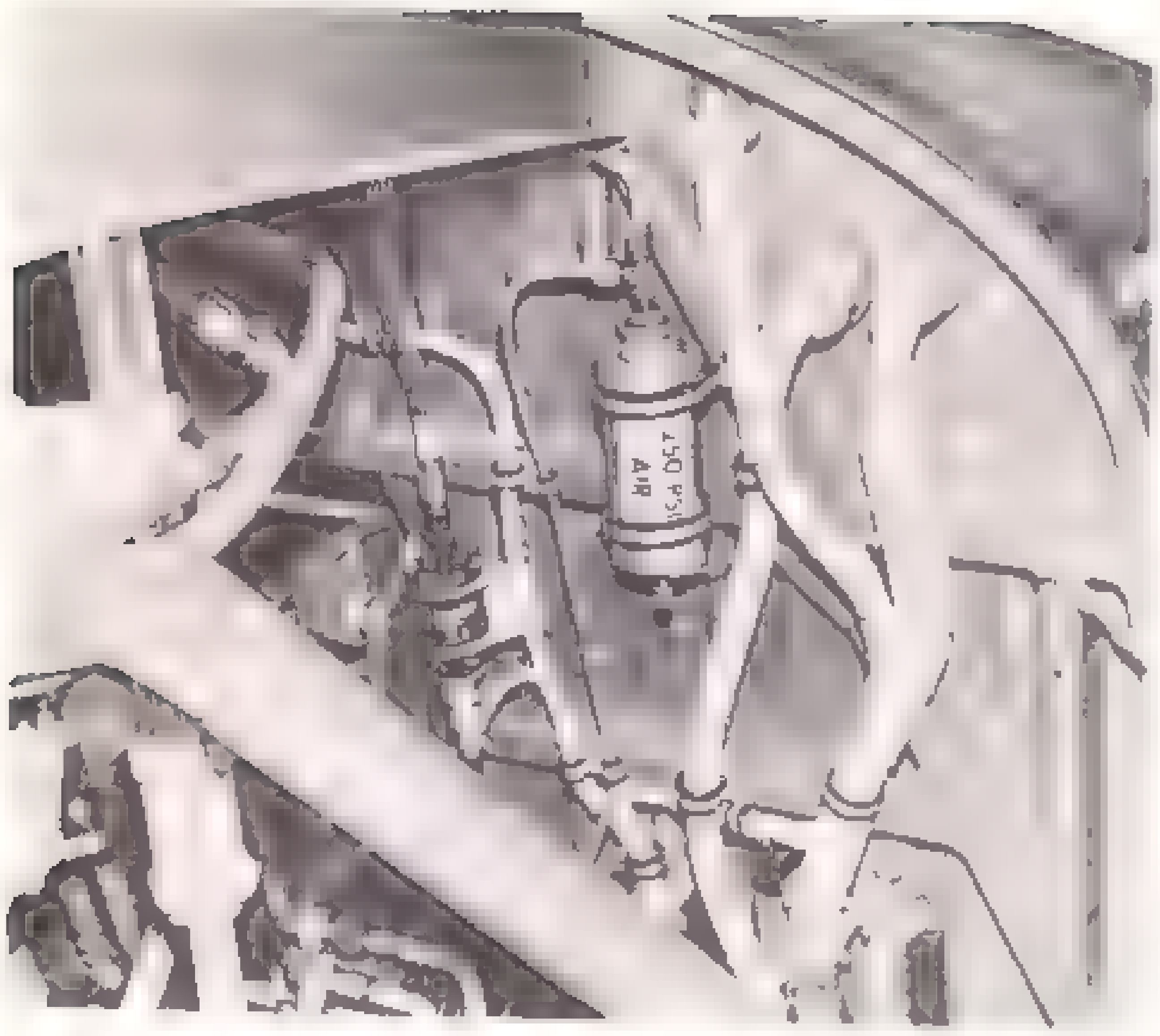


Figure 6–13. Accumulator with pressure switch installed

canted bulkhead in the main transmission compartment. The accumulator furnishes thermal relief compensation for the rotor brake hydraulic system.

a. Removal. (1) Hinge down service platform on right side of helicopter.

(2) Disconnect tube assemblies from tee installed in upper end of accumulator and drain hydraulic fluid from tube assemblies into a container.

(3) Remove bolts and washers securing clamps on accumulator and remove accumulator.

(4) Remove tee from upper end of accumulator and cap open port of accumulator.

b. Cleaning. Clean accumulator with a clean, lint-free cloth moistened with solvent (item 4, table 1–8).

c. Inspection. Inspect accumulator for cracks, dents, and corrosion.

d. Installation. (1) Remove cap from port at upper end of accumulator and install tee in accumulator.

(2) Position accumulator in clamps on bulkhead in main transmission compartment and secure clamps with bolts and washers.

(3) Remove caps from tube assemblies and connect tube assemblies to tee installed in upper end of accumulator.

(4) Charge accumulator in accordance with paragraph *e* below.

(5) Fill and bleed rotor brake hydraulic system in accordance with paragraph 6–47 or 6–48.

(6) Close service platform.

e. Charging accumulator. Using an air gage assembly, Military Specification MIL-G-8348, and suitable air pressure equipment, charge accumulator as follows:

Note

Accumulator operates automatically and requires no adjustment or lubrication.

(1) Connect swivel nut chuck on air gage assembly to air valve on accumulator; tighten chuck and thread depressing pin into air valve.

(2) Back off accumulator safety valve lock nut three turns.

(3) Open pressure inlet valve on air gage assembly. Apply air pressure. Charge accumulator to pressure specified in table 6–1.

(4) Close air gage assembly inlet valve and stop source of air pressure. Air gage assembly should now indicate accumulator pressure.

Note

When charging accumulator as part of filling and bleeding procedure, do not remove air gage assembly until bleeding is complete.

(5) Tighten accumulator safety valve lock nut and remove air gage assembly.

6–51. Relief Valve. The relief valve prevents the possibility of excessive pressure being built up in the rotor brake hydraulic system. Should the pressure in the rotor brake hydraulic system exceed 400 psi, the relief valve will open and vent overboard. The relief valve is preset at 400 psi by the manufacturer.

a. Removal. (1) Hinge down service platform on right side of helicopter.

(2) Disconnect vent line from relief valve.

(3) Remove screw and nut securing clamp on relief valve.

(4) Remove relief valve from tee installed on hydraulic line of rotor brake hydraulic system.

b. Cleaning. Clean relief valve with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect relief valve for cracks, dents, and malformed threads.

d. Installation. (1) Install relief valve in tee of hydraulic line of rotor brake hydraulic system.

(2) Position clamp around relief valve and secure with screw and nut.

(3) Connect vent line to relief valve.

(4) Close service platform.

(5) Fill and bleed rotor brake hydraulic system in accordance with paragraph 6–47 or 6–48.

6–52. Check Valve. The check valve is installed in the rotor brake hydraulic system for attaching pressure bleeding equipment. The check valve allows the flow of hydraulic fluid in one direction only.

a. Removal. (1) Hinge down service platform on left side of helicopter.

(2) Remove screw, washer, and nut securing clamp on check valve and remove clamp.

(3) Remove check valve from tube assembly.

b. Cleaning. Clean check valve with solvent (item 4, table 1–8) and dry with filtered compressed air.

c. Inspection. Inspect check valve for cracks, dents, and malformed threads.

d. Installation. (1) Install check valve on tube assembly.

(2) Position clamp on check valve and secure with screw, washer, and nut.

(3) Bleed rotor brake hydraulic system in accordance with paragraph 6–47 or 6–48.

(4) Close service platform.

6–53. Hydraulic Lines, Fittings, and Clamps. There are two types of hydraulic lines used in the rotor brake hydraulic system, rigid aluminum alloy tube assemblies and flexible hose assemblies. The hydraulic lines use conventional fittings and clamps and can be removed or installed easily with common tools.

a. Removal. (1) Hinge down service platform on each side of helicopter.

(2) Remove attaching hardware and remove clamps from tube or hose assemblies to be removed.

(3) Disconnect tube or hose assemblies from other tube or hose assemblies or hydraulic components, and remove tube or hose assemblies.

(4) Cap open ends of tube or hose assemblies and all open ports of hydraulic components left installed to prevent entry of foreign matter into rotor brake hydraulic system.

(5) Remove fittings (elbows or nipples) installed in fuselage structure by first noting position of fittings. Remove nuts and washers and remove fittings from fuselage structure.

b. Inspection. (1) Inspect tube assemblies for cracks and dents and end fittings for malformed threads.

(2) Inspect hose assemblies for fraying and deterioration and end fittings for malformed threads.

(3) Inspect fittings (elbows or nipples) for cracks, dents, and malformed threads.

c. Installation. (1) Position fittings (elbows or nipples) in fuselage structure as noted at time of removal and secure with washers and nuts.

(2) Remove caps from ends of tube or hose assemblies and ports of hydraulic components. Blow tube or hose assemblies clear with dry, filtered compressed air.

(3) Place tube or hose assemblies in their respective positions and connect to other tube or hose assemblies or hydraulic components.

(4) Position clamps on tube or hose assemblies and secure with attaching hardware.

(5) Fill and bleed rotor brake hydraulic system in accordance with paragraph 6–47 or 6–48.

(6) Close service platforms.

Section III Pneumatic System

Not Applicable

CHAPTER 7

POWER TRAIN SYSTEM

Section I Scope

7—1. Purpose. The purpose of this chapter is to provide all the essential information for organizational maintenance personnel to accomplish maintenance on the complete power train system as prescribed by the Maintenance Allocation Chart.

7—2. Description. This chapter consists of the main drive shaft, clutches, main transmission, tail rotor drive shaft, intermediate gear box, and tail rotor gear box. The power train system transmits torque from the engine to the main and tail rotors, reduces engine rpm to the desired main and tail rotor rpm, and drives the accessories at the required relative rpm. (See figure 7—1.)

7—3. Special Tools. Special tools required for the performance of organizational maintenance are listed in TM 55-1520-202-20P, Organizational Maintenance Repair Parts and Special Tools Lists.

7—4. Metal Particle Contamination of Main, Intermediate, and Tail Rotor Gear Box Oil. Metal particles found on the main gear box oil strainer screen or oil filter (detail A, figure 7—2), illumination of warning light in the magnetic chip detector system of the main gear box, and metal particles found on main, intermediate or tail gear box magnetic plug (detail B through F) or in oil may indicate failure of an internal part of the gear box. When metal particle contamination is detected, the gear boxes must be flushed. Oil may be checked for metal particles by filtering through cheesecloth or filter paper. The gear boxes shall be inspected for metal particle contamination at the following times:

a. At time of any oil change.

b. After any incident in which damage to gear box could have occurred.

c. When metal particles are suspected of being present.

d. When magnetic chip detector warning light illuminates. Presence of metal particles is not necessarily an indication that the gear box is no longer serviceable. Quantity, source, form, and type of metal found, together with service history of the particular gear box, must be taken into consideration. Time accumulated since the gear box was new or overhauled, previous failures, and type of operation are important factors in determining further serviceability of the unit. Metal particles found may be various shapes and quantities and consist of steel, tin, lead, cadmium, aluminum, magnesium, copper, bronze, or phenolic material. For a detailed explanation of the action made necessary by the presence of each of the possible types of metal particles in the gear box, refer to table 7—1.

Caution

When any metal particles found are readily identifiable as fragments of gear box parts, such as gears, nuts, bearings, oil flingers, thrust washers, snap rings, safetywire, or other components, the gear box must be replaced.

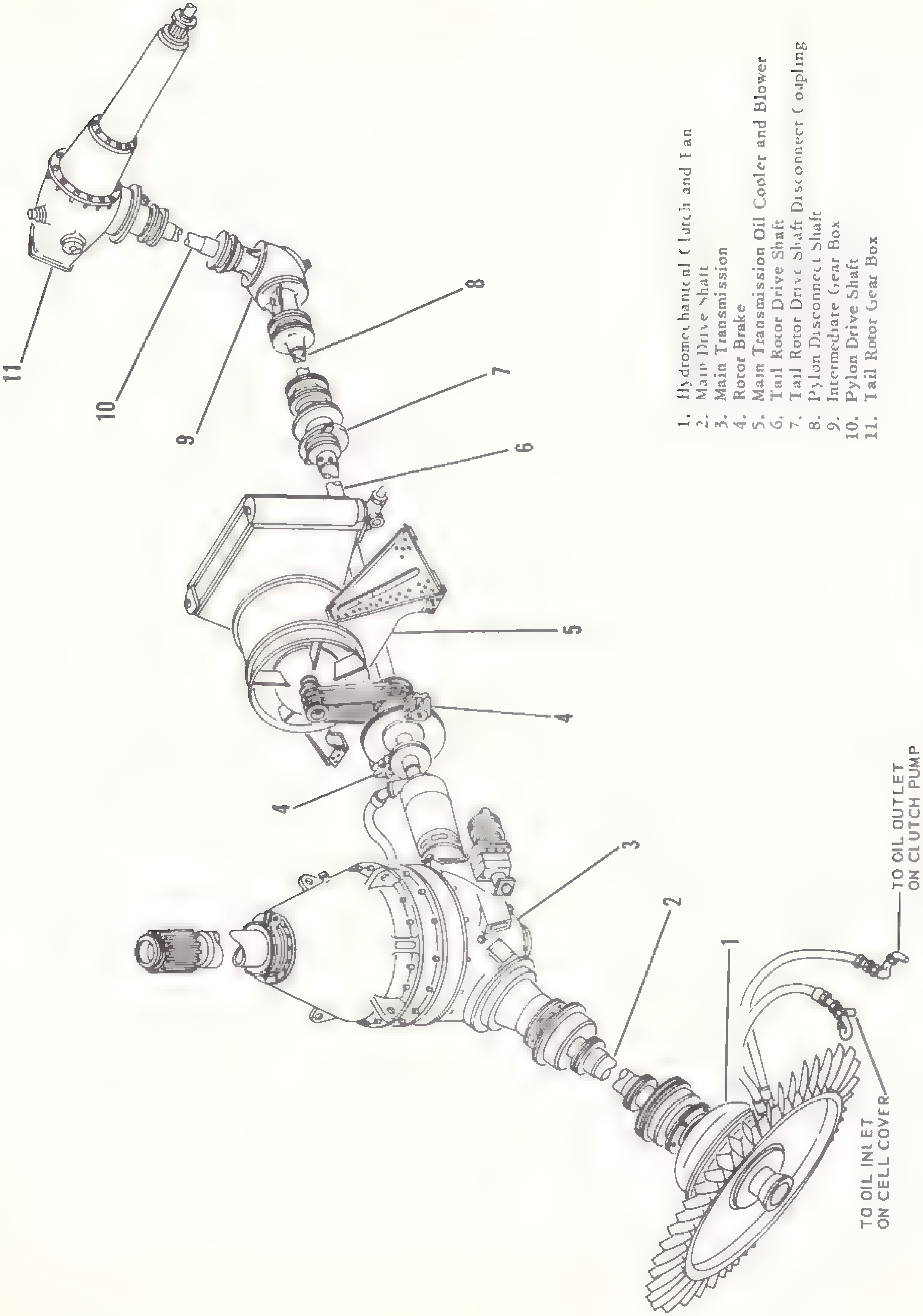
7—5. Identification of Metal Particles. (See figure 7—2.) A visual inspection of color and hardness will occasionally suffice to identify the particles. When visual inspection does not positively identify the particle, the kind of particle present may be determined by a few simple tests. Equipment to perform tests includes a permanent magnet, an electric soldering iron, hydrochloric acid (item 47, table 1—8), and nitric acid (item 46, table 1—8). Proceed as follows:

Warning

Concentrated hydrochloric and nitric acids are highly corrosive. Use extreme caution when handling these acids to prevent damage to equipment, clothing, or injury to personnel. If acid is spilled, flush affected area with an ample amount of water. If available, a solution of water and sodium bicarbonate (item 18, table 1—8) may be used to neutralize the acid. Thoroughly flush this solution from all surfaces of helicopter after use.

a. Steel. Isolate steel particles with a permanent magnet.

b. Tin and lead. Distinguish tin and lead by their low melting points. Clean soldering iron; heat to about 500 °F; then tin it with 50-50 solder (50 percent lead and 50 percent tin). Wipe off excess solder. A tin or lead particle dropped onto a hot, tinned soldering iron will melt and fuse with the solder. Do not overheat iron.



1. Hydromechanical Clutch and Fan
2. Main Drive Shaft
3. Main Transmission
4. Rotor Brake
5. Main Transmission Oil Cooler and Blower
6. Tail Rotor Drive Shaft
7. Tail Rotor Drive Shaft Disconnect Coupling
8. Pylon Disconnect Shaft
9. Intermediate Gear Box
10. Pylon Drive Shaft
11. Tail Rotor Gear Box

Figure 7–1 Power train system

Table 7–1. Metal particle contamination — main, intermediate, and tail rotor gear box oil

KIND OF METAL	QUANTITY AND/OR SIZE	ACTION REQUIRED	NOTES
Steel	Fuzz, fine, hair-like particles. (See detail B, figure 7–2.)	None	Result of normal wear. May have exaggerated appearance because of presence of oil.
	Particles in splinter or granular form. (See details C and D, figure 7–2.)	Perform thorough inspection. Replace if necessary (notify direct support maintenance unit).	Usually indicates failure.
	Thin flakes not exceeding 0.030 inch in diameter and 0.25 inch in length. Quantity not to exceed 20 flakes. (See detail E, figure 7–2.)	Perform thorough inspection	Small quantity will not cause bearing failure.
	More than 20 flakes not exceeding 1/32 (0.030) inch in diameter and 1/4 (0.25) inch in length; and quantity of flakes exceeding the above dimensions.	Perform thorough inspection. Replace if necessary (notify direct support maintenance unit).	Usually indicates failure.
Tin, Lead, or Cadmium	Particles not exceeding 0.0005 inch in thickness.	None	Component plating material only.
	Particles exceeding 0.0005 inch in thickness.	Perform thorough inspection.	
Aluminum or Magnesium	Particles in granular form	Perform thorough inspection. Replace if necessary (notify direct support maintenance unit).	May be result of use of these materials as mallets or drifts during assembly. May indicate wear of oil pump interior surfaces.
Copper (Bronze)	Particles in granular form. (See detail F, figure 7–2.)	Perform thorough inspection. Replace if necessary (notify direct support maintenance unit).	May indicate excessive wear of thrust washers.
Phenolic	Particles in granular form	None.	Result of the use of mallets and drifts during assembly.

c. Aluminum. Determine aluminum particles by their reaction to hydrochloric acid. When a particle of aluminum is dropped into the hydrochloric (muriatic) acid, it will fizz with a rapid emission of bubbles. The particles will gradually disintegrate and form a black residue. Copper, bronze, and phenolic do not noticeably react to hydrochloric acid.

Note

Since magnesium and aluminum react similarly in hydrochloric acid, when in doubt, drop the particle into nitric acid. Aluminum does not react noticeably to nitric acid.

d. Copper or bronze and magnesium. Differentiate copper or bronze and magnesium by their respective reactions to nitric acid. When a particle of copper or bronze is dropped into nitric acid, it forms a bright green cloud. When a particle of magnesium is dropped into nitric acid, it fizzes with a rapid emission of bubbles. Phenolic and aluminum do not react noticeably to nitric acid.

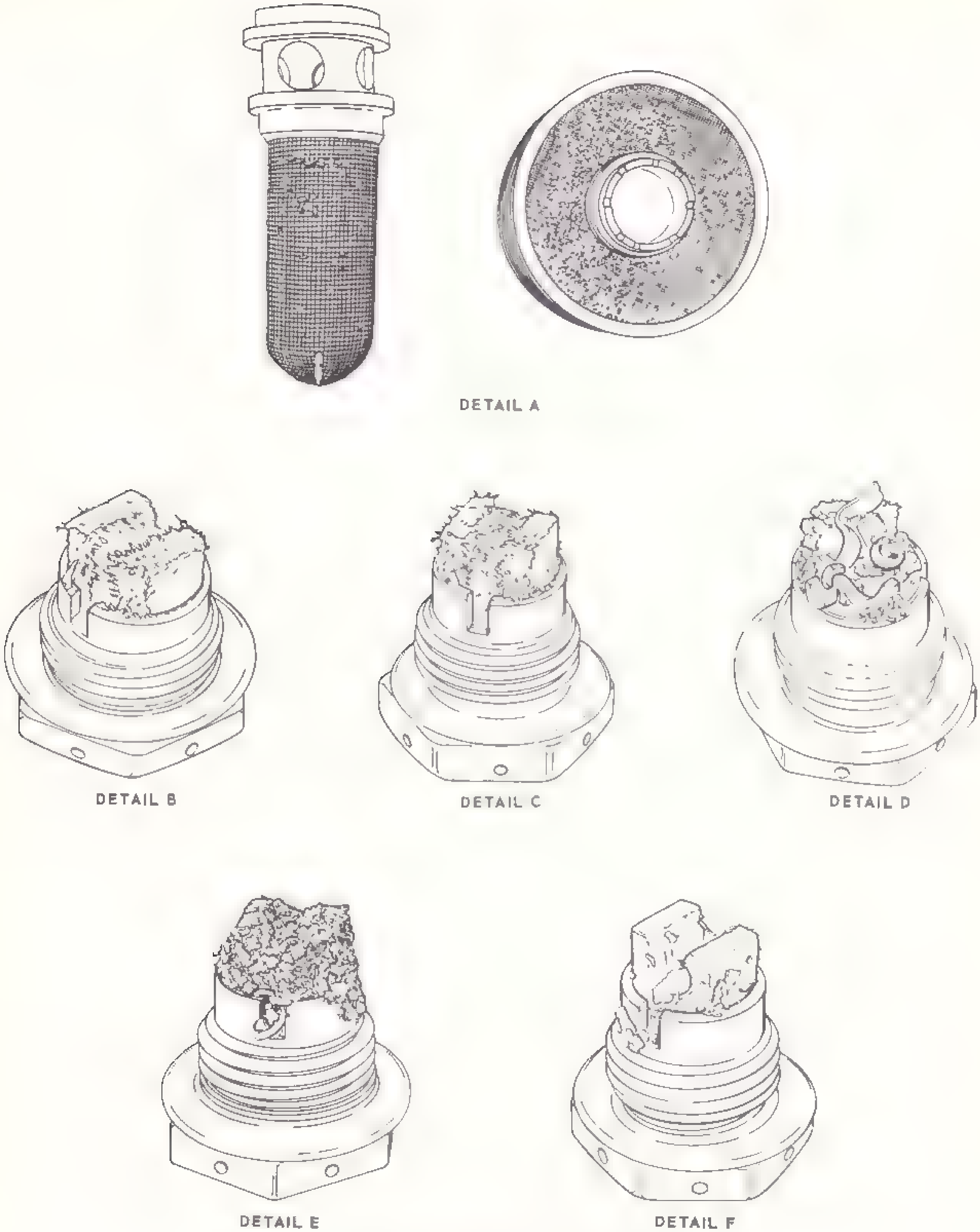


Figure 7-2. Identification of metal particles

Section II Main Drive Shaft

7–6. Description. The main drive shaft assembly (2, figure 7–1) is composed of a main drive shaft, an upper and lower rubber coupling, adjustment spacers, and a flange. The rubber couplings absorb shocks in the power train system. The spacers permit required adjustment in drive shaft length. Access to the main drive shaft is gained through the clutch access (carburetor induction heat) door in the cabin forward bulkhead and through the drive shaft tunnel extension cover.

7–7. Main Drive Shaft. The purpose of the main drive shaft is to transmit engine torque from the hydromechanical clutch to the main gear box.

7–8. *Cleaning.* Clean surface of drive shaft with solvent (item 4, table 1–8). Wipe dry with a clean cloth.

7–9. *Inspection.* Inspect drive shaft for scratches, nicks, gouges, and dents. Check all connections for security.

7–10. Main Drive Shaft Rubber Couplings. The main drive shaft rubber couplings transmit engine torque, absorb transmission shock and vibration, and adjust for permissible minor misalignment of the components. One upper and one lower rubber coupling are installed. Each rubber coupling is composed of two metal jaws with interlocking vanes that are joined by molded rubber segments between their mating surfaces. The brick-shaped rubber segments are each bonded to two vanes, one from each jaw. Spacers occur alternately between the tapered sides of the vanes.

7–11. *Cleaning.* Clean exterior surfaces of rubber couplings with a clean cloth. Use a soft-bristle brush if necessary to remove foreign matter.

7–12. *Inspection. a.* Perform fluorescent penetrant inspection on metal parts of rubber couplings in accordance with Military Specification MIL-I-6866.

b. Inspect rubber couplings for excessive elongation of bolt holes.

Note

A maximum of 0.001-inch elongation is permissible in 0.376/0.377-inch diameter holes on 9.500-inch diameter bolt circle. In the following steps the term segment will signify one rubber segment and both its bonded surfaces; the term face will signify one of the four unbonded surfaces of the rubber segment.

c. With aid of blunt instrument, which will not cut, gouge, or otherwise damage rubber segments, visually inspect rubber couplings to determine depth and extent of rubber bond separations from vanes. (See figure 7–3.)

Note

Be careful not to scratch the protective finish of the metal jaws of the coupling. A piece of phenolic with a rounded tip makes a suitable inspection tool.

d. Each bonded surface of a rubber segment has four edges, formed where it meets planes of other surfaces. A rubber bond separation from the metal vane may occur at any of these edges: eight edges for two bonded surfaces of brick-shaped rubber segments; four edges for one bonded surface of the rubber segments between tapered sides of vanes.

Note

A single bond separation extending over two faces of a segment at these edges shall be considered as two separations, and their individual depth shall be measured from the face to which each portion is related.

e. With aid of blunt instrument, visually inspect faces of rubber segments for cuts, tears, or other defects that may be present, and determine their depth and extent.

Note

A single cut, tear, or other defect extending over two faces of a segment will be considered as two defects, and their individual depth will be measured from the face in which each portion occurs.

f. Maximum depth of bond separation, cut, tear, or other defect per segment for rubber couplings is 5/9 inch where only one defect of any kind is present in that segment. In cases where more than one defect exists in a segment, the sum of depths of all defects shall not exceed 5/8 inch. Be sure to include depth of each portion of any defect extending over more than one face. Length of any bond separation, cut, or tear in any one face of a rubber segment is not significant.

g. Replace rubber coupling when any one defect, or combination of defects in one segment, as outlined in steps *c* through *f*, exceeds maximum specified. The number of segments with defects is not limited, provided none of the segments are damaged beyond the maximum limits.

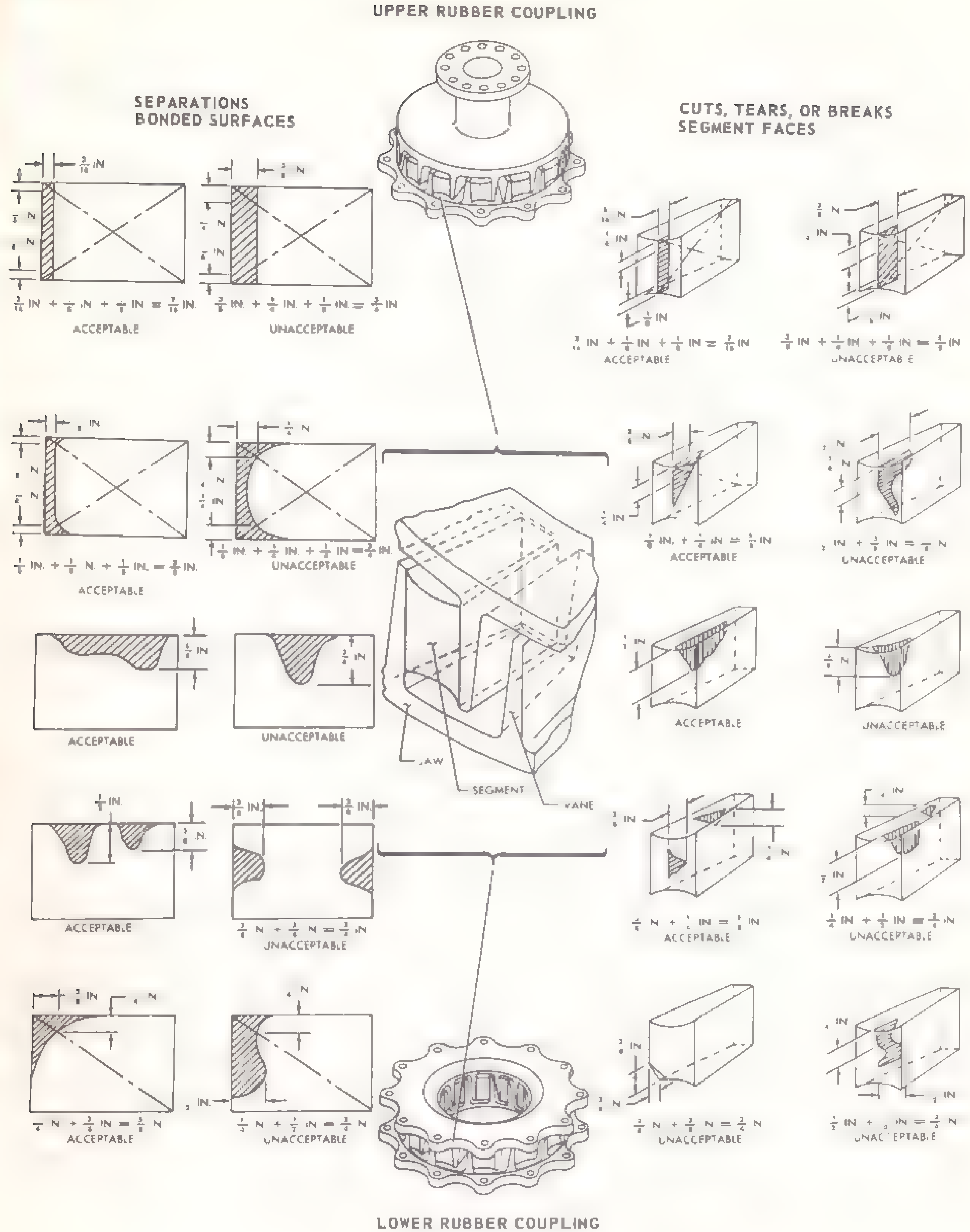


Figure 7–3. Damage limitations on main drive shaft rubber couplings

Section III Clutches

7—13. Description. This section contains the maintenance functions prescribed for organizational maintenance on the hydromechanical clutch and the clutch hydraulic system. The clutch hydraulic system operates off of engine oil and consists primarily of the clutch pump or the diverter valve and the necessary hoses and tubing to interconnect the clutch hydraulic system.

7—14. Hydromechanical Clutch. The hydromechanical clutch makes it possible to start and operate the engine at any speed without engaging the rotors, permits smooth engagement of the engine torque to the power train system through a fluid coupling, provides a positive mechanical coupling of the engine to the power train system, allows freewheeling of the rotors when the helicopter is in autorotation, and allows the rotors to be disengaged and stopped without stopping the engine. The fluid coupling, consisting of a vaned driving disc and a vaned driven disc, and the mechanical coupling, consisting of a freewheel unit controlled by the action of a flyball governor, an actuator, and a blocker plate, are the main components of the hydromechanical clutch assembly. The lower end of the hydromechanical clutch assembly is secured to the fan assembly; the upper end is secured to the lower rubber coupling on the main drive shaft assembly. Engine oil is used in the fluid coupling and is supplied through a hose from the clutch pump mounted on the cover of the left oil cell or through a pressure line from the diverter valve mounted above the cover of the right oil cell. A return hose leads from the clutch back to the oil cell cover. Access to the clutch and fan assembly is gained through the clutch access door in the cabin forward bulkhead. (See figure 7—4.)

Caution

To avoid overheating and subsequent damage to the clutch, do not run the engine above 1400 rpm with the clutch disengaged. (Refer to paragraph 7—16.)

7—15. Troubleshooting. For troubleshooting procedures for the hydromechanical clutch proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Clutch does not engage	Leakage in clutch oil lines	Replace lines if necessary. Seal attachment points with sealing compound (item 45, table 1—8). Tighten clamps.
	Rotor brake on	Release rotor brake.
	Leakage in clutch	Notify direct support maintenance unit.
	Improper clutch pump output	Replace clutch pump. (Refer to paragraphs 7—20*b* and *e*.)
	Internal failure of clutch	Notify direct support maintenance unit.
	Malfunction of rotor brake system pressure switch	Replace pressure switch. (Refer to paragraphs 10—152 and 10—154.)
Clutch leaks engine oil excessively	Deterioration of seals	Notify direct support maintenance unit.
Excessively high frequency vibrations	Damaged fan blades	Notify direct support maintenance unit.
Disengagement difficulties regularly encountered	Clutch drains oil line above fitting at the clutch	Reposition oil lines.
	Excessive misalignment of clutch output flange and main drive shaft	Notify direct support maintenance unit.
Engagement difficulties regularly encountered	Excessive misalignment of clutch output flange and main drive shaft	Notify direct support maintenance unit.

Figure 7–4. Hydromechanical clutch and fan assembly

7–16. Operating Limits for Disengaged Clutch. It is recommended that the engine not be run above 1400 rpm with the clutch disengaged to avoid overheating and subsequent damage to the clutch. Should it be necessary to run the engine above 1400 rpm with the clutch disengaged, the maximum operating times listed in table 7–2 must not be exceeded.

Warning

Engine rpm in table 7–2 are subject to any engine limitations that may exist.

7–17. Cleaning. Clean exterior surface of clutch and fan assembly with solvent (item 4, table 1–8). Wipe dry with a clean, lint-free cloth.

7–18. Inspection. a. Brush any loose corrosion deposits from fan blade, using a soft-bristled brush.

b. Inspect fan blades for erosion of leading and trailing edges, for surface damage, and corrosion pitting of surfaces. For repairs notify direct support maintenance unit.

Note

Erosion resembles a sand-blasted surface.

c. Inspect leading and trailing edges for nicks. For repairs notify direct support maintenance unit.

d. Inspect surfaces of fan blade for nicks, gouges, or scratches. For repairs notify direct support maintenance unit.

e. Check clearance between tip of four equally spaced fan blades and fan shroud assembly. This clearance should be equal and should be between 0.052 and 0.103 inch.

Table 7–2. Operating limits for disengaged clutch

*ENGINE RPM	TIME LIMITATION – MINUTES *OUTSIDE AIR TEMPERATURE ABOVE 27°C (81°F)	**OUTSIDE AIR TEMPERATURE BELOW 27°C (81°F)
1600	15	20
1800	10	15
2000	5	10
2500	1	3
2800	0.5	1

*Total declutched consecutive time at any combination of these rpm should not exceed 15 minutes

**Total declutched consecutive time at any combination of these rpm should not exceed 25 minutes

f. Inspect clutch assembly for oil leakage. Leakage of the clutch assembly, caused by faulty gasket or parting flange, must not exceed the maximum listed in table 7–3. Total leakage from all sources must not exceed 3 cubic centimeters after any one clutch engagement.

7–19. Clutch Hydraulic System. The clutch hydraulic system (figure 7–5) consists of the clutch pump or the diverter valve, the hoses and tube necessary to connect the clutch pump or diverter valve to the clutch, and the CLUTCH-OFF switch and warning light, located on the pilot's side of the control console in the cockpit. On helicopters serial No. prior to 56-4313, a clutch pump is installed. On helicopters serial No. 56-4313 and subsequent, a diverter valve is installed. When the clutch pump switch is turned on, engine oil is pumped from the left oil cell through the pressure line to the clutch. When the switch is turned off, the oil drains from the clutch through the oil return line back to the left oil cell. When the diverter valve switch is turned on, engine oil, returning to the oil cell from the engine oil pump, is diverted from the oil return line into the clutch oil pressure line. When the clutch switch is turned off, oil drains from the clutch through the oil return line into the left oil cell, and

Table 7–3 Clutch oil leakage

COMPONENT	MAXIMUM LEAKAGE PER COMPONENT
Gasket	1 cubic centimeter per hour
Parting Flange	1 cubic centimeter per hour

Note

Replacement of a gasket because of leakage or replacement of the clutch assembly because of a leaking parting flange is unnecessary unless the leakage exceeds the maximums listed above.

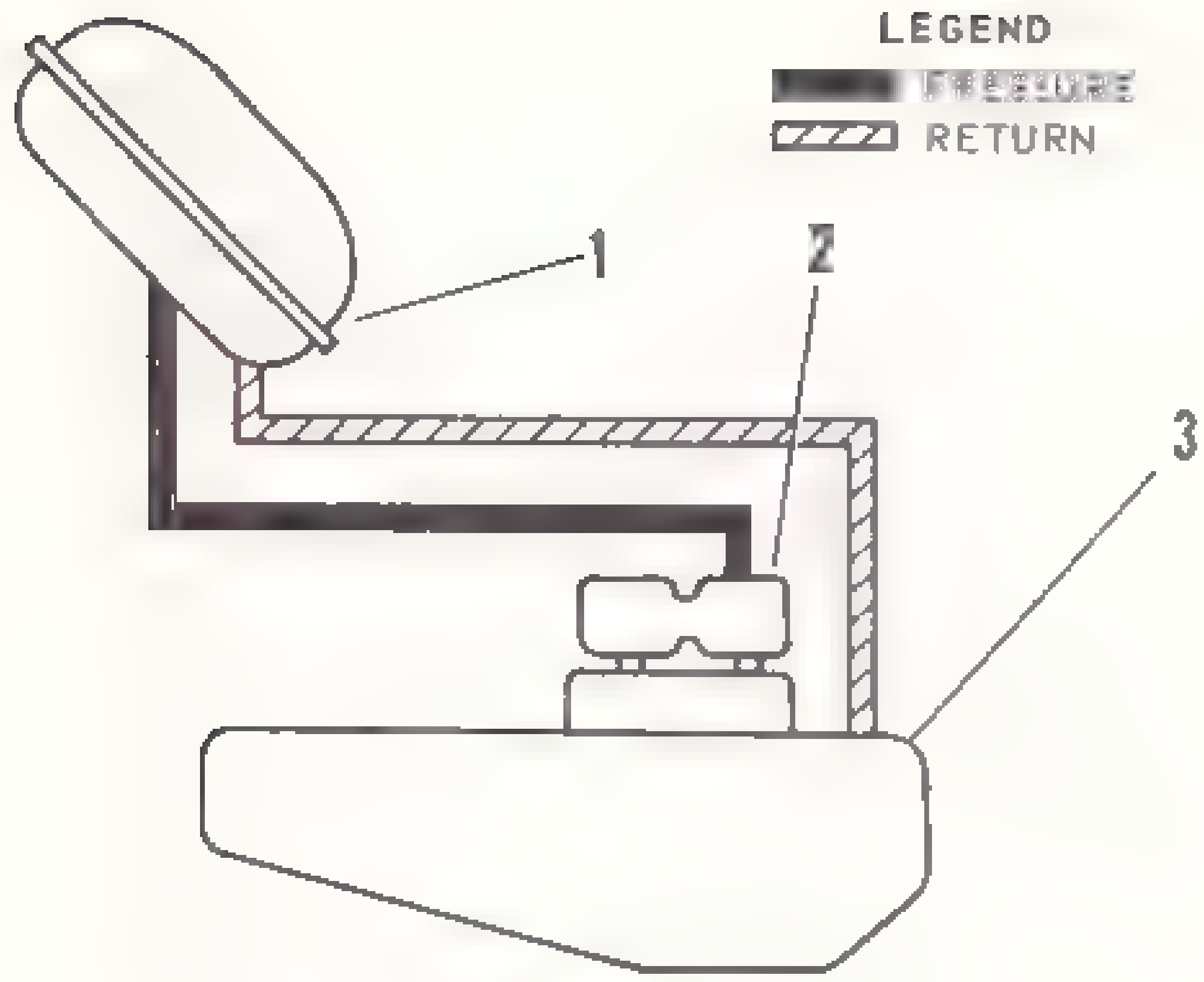


Figure 7—5. Clutch hydraulic system schematic diagram

residual oil from the clutch oil pressure line drains down into the right oil cell. The warning light remains on when the clutch pump or diverter valve is operating.

7—20. Clutch Pump. On helicopters serial No. prior to 56-4313, and electrically driven clutch pump (figure 7—6), which supplies oil for the clutch, is installed on the cover assembly on top of the left oil cell forward of the canted bulkhead in the engine compartment. The clutch pump draws engine oil from the left oil cell when the CLUTCH-OFF switch on the control console is placed in the CLUTCH position. A pressure switch in the rotor brake system on helicopters serial No. 55-4462 and subsequent opens the clutch pump circuit, preventing the pump from operating when the rotor brake is engaged. A warning light is lighted during operation only. A pressure line carries oil to the clutch; a return line connects to the left oil cell; and an inlet tube assembly, through which the engine oil is drawn, runs from the clutch pump directly to the oil cell below.

a. Troubleshooting. For troubleshooting procedures for the clutch pump, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Clutch pump does not operate	Rotor brake engaged	Release rotor brake.
	Open circuit in the clutch pump system	Check for continuity of wiring. Clean and tighten connections.
	Clutch/Pump motor burned out	Replace clutch pump. (Refer to paragraphs 7—20*b* and *e*.)
Rotor brake system pressure switch malfunctions	Defective pressure switch	Replace pressure switch. (Refer to paragraphs 10—152 and 10—154.)
Clutch pump motor operates but pump has low or no output	Internal failure of pump	Replace clutch pump. (Refer to paragraphs 7—20*b* and *e*.)
Oil being drawn through clutch when clutch pump is not operating	Worn clutch pump gears	Replace clutch pump. (Refer to paragraphs 7—20*b* and *e*.)

b. Removal. (1) Open nose doors.

Warning

Make certain all electrical power is turned off.

(2) Disconnect wiring to pump at disconnect plug (5, figure 7—6).

(3) Disconnect pressure tube (2) and drain tube (6) from elbow and nipple in pump housing and drain into receptacle.

(4) Remove bolts which secure clutch pump (3) to cover assembly on left oil cell.

(5) Unscrew inlet fitting connecting oil inlet tube assembly to the clutch pump inlet port. Remove clutch pump from cover assembly.

(6) Unscrew elbow from clutch pump outlet port and nipple from drain opening on clutch pump.

c. Cleaning. Clean external surfaces of clutch pump with solvent (item 4, table 1—8). Wipe dry with a clean cloth.

d. Inspection. Inspect clutch pump for the following prior to installation:

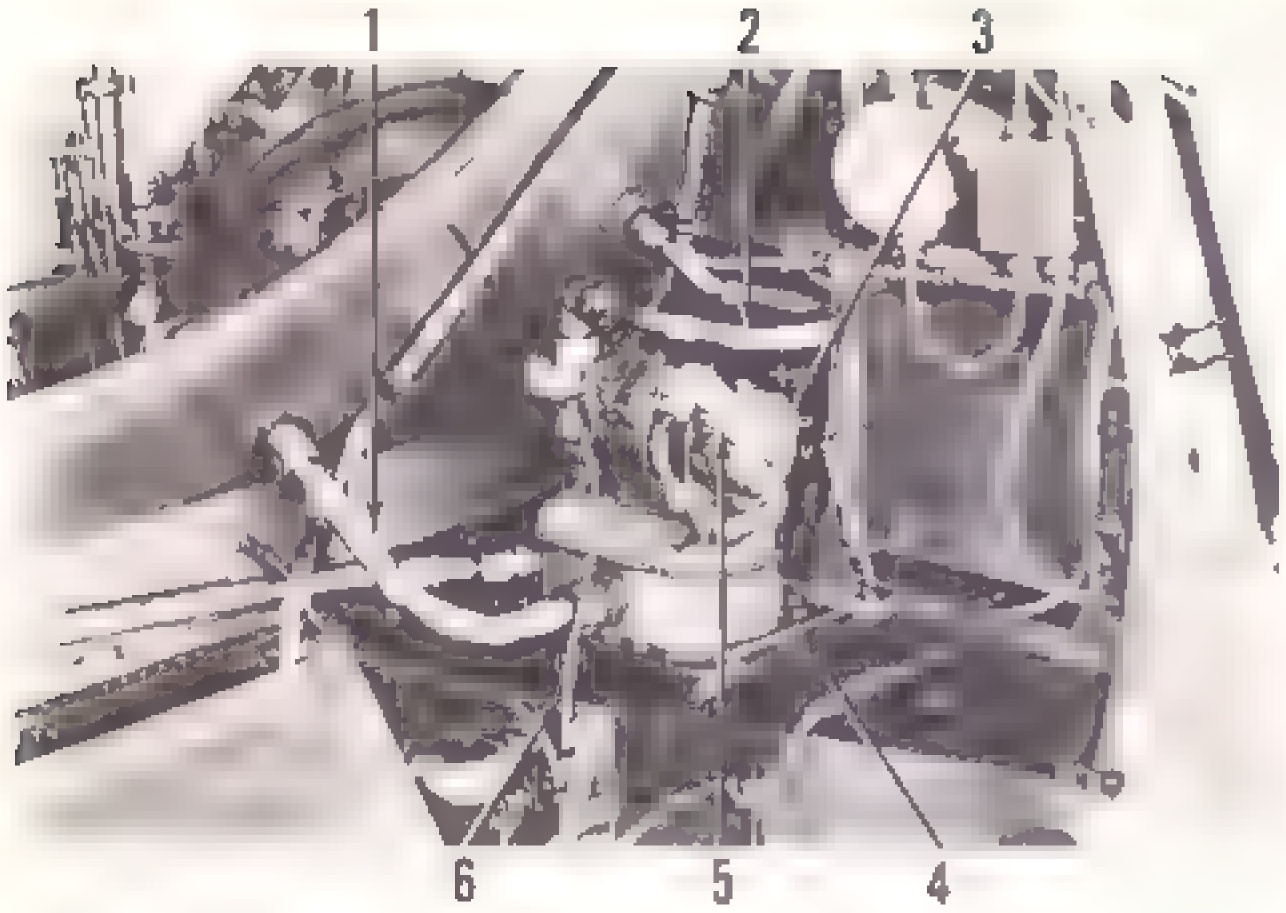
(1) Check fittings for crossed or burred threads.

(2) Check clutch pump for structural cracks or breaks in housing.

(3) Check clutch pump for overall serviceable condition.

e. Installation. (1) Install elbow in clutch pump outlet port and nipple in drain opening on clutch pump housing.

(2) Position clutch pump (3, figure 7—6) on top of oil cell cover assembly and secure pump with attaching bolts.



1. Return Tube
2. Pressure Tube
3. Clutch Pump
4. Oil Cell Cover
5. Disconnect Plug
6. Drain Tube

Figure 7–6. Clutch pump (helicopters serial No. prior to 56-4313)

(3) Connect pressure tube (2) to elbow on clutch pump outlet port and drain tube (6) to nipple on clutch pump.

Warning

Make certain all electrical power is turned off.

(4) Connect electrical wires to clutch pump at disconnect plug (5).

(5) Tighten inlet fitting from oil inlet tube assembly into clutch pump inlet port.

(6) Close nose doors.

7–21. Clutch Diverter Valve. On helicopters serial No. 56-4313 and subsequent, an electrically actuated diverter valve is installed in the oil return line from the oil cooler to the oil cells. The valve is positioned above the cover assembly on top of the right oil cell forward of the canted bulkhead in the clutch compartment. When the CLUTCH-OFF switch on the control console is placed in the CLUTCH position, the valve diverts oil that is returning to the oil cells from the engine oil pump in the clutch oil pressure line. A red warning light, located next to the switch, lights when oil is flowing to the clutch. A pressure line carries oil from the diverter valve to the clutch; an oil return line connects the clutch to the left oil cell. A drain line between the valve and the right oil cell allows residual oil to drain from the pressure line after each clutch engagement. A manual override toggle switch on the valve indicates the position of the valve gate and allows manual operation of the valve in the event of electrical failure. A pressure switch in the rotor brake system prevents operation of the diverter valve while the rotor brake is engaged. (See figures 7–7 and 7–8.)

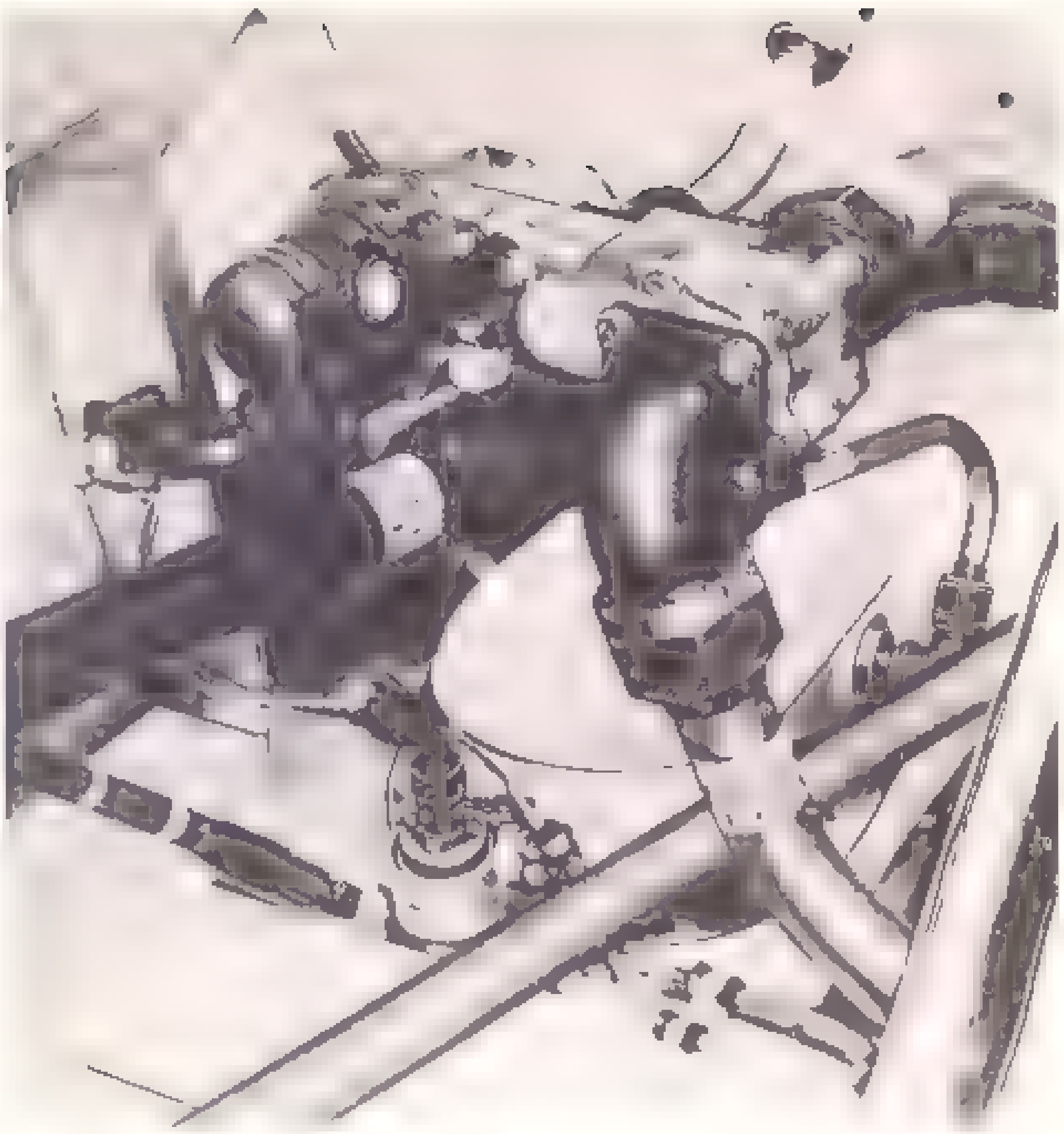


Figure 7–7 Clutch diverter valve (helicopters serial No. 56-4313 and subsequent)

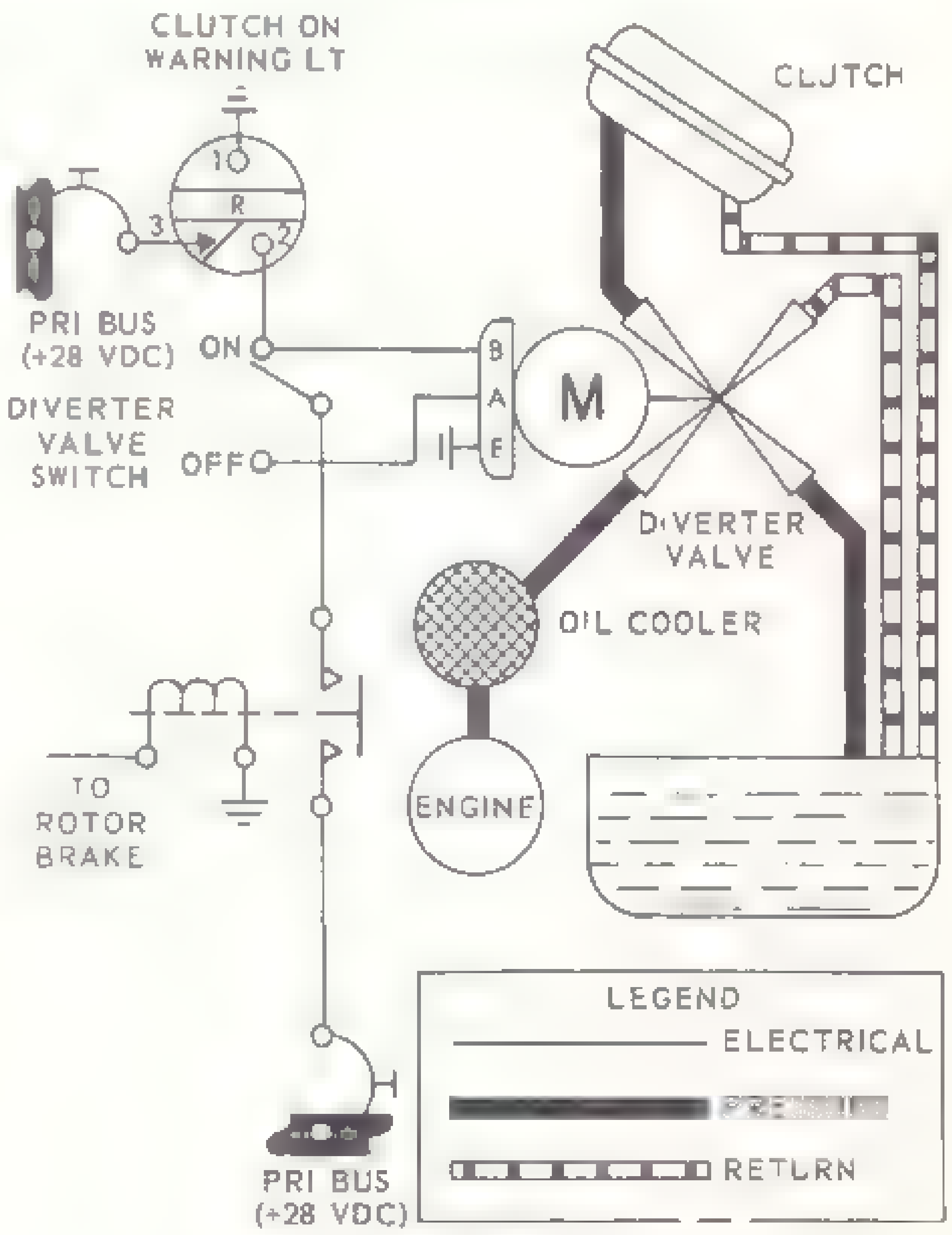


Figure 7–8. Clutch diverter valve system schematic diagram (helicopters serial No. 56 4313 and subsequent)

Caution

Release main rotor brake before operating diverter valve manually.

a. Removal. (1) Open nose doors.

Warning

Make certain all electrical power is turned off.

(2) Disconnect electrical wiring from diverter valve at disconnect plug.

(3) Disconnect drain hose from elbow in bottom of valve.

(4) Disconnect clutch pressure tube from connector at rear of valve.

(5) Support valve. Disconnect oil cooler tube from elbow at front of valve and oil cell tube from connector at rear of valve. Remove valve.

(6) Loosen nut and remove elbow, nut, and gasket from drain port of valve.

(7) Cut lock wire and remove bolts and washers that secure flange to inlet port of valve. Remove elbow, flange, and gasket.

(8) Cut lock wire and remove bolts and washers that secure connector to each outlet port of valve. Remove connectors and gaskets.

b. Cleaning. Clean external surfaces of clutch diverter valve with dry cleaning solvent (item 4, table 1–8). Wipe dry with a clean cloth.

c. Inspection. Inspect clutch diverter valve for the following prior to installation:

(1) Inspect valve fitting for burrs, crossed threads, and damaged ports.

(2) Check valve electrical components for damaged or broken parts.

(3) Inspect valve seals and gaskets for deterioration.

(4) Inspect valve for overall condition.

d. Installation. Install diverter valve as follows:

Note

If preformed packing is furnished with diverter valve at inlet port and both outlet ports, gaskets mentioned in this paragraph may be omitted at those ports.

(1) Position preformed packing or gasket and connector at oil cell outlet port near left rear corner of valve and secure them with bolts and washers. Secure bolts with lock wire.

(2) Position preformed packing or gasket and connector at clutch outlet port of valve and secure them with bolts and washers. Secure bolts with lock wire.

Note

Clutch outlet port is to right of oil cell outlet port.

(3) Position preformed packing or gasket, elbow, and flange at inlet port of valve. Install bolts and washers, but do not tighten bolts.

(4) Install nut on drain port elbow. Install elbow and gasket in drain port at bottom of valve with elbow pointing to rear. Do not tighten nut.

(5) Position valve above right oil cell cover with electrical receptacle at right. Connect oil cooler tube to elbow at inlet port of valve and oil cell tube to connector at oil cell outlet port of valve.

(6) Connect clutch pressure tube to connector at clutch outlet port of valve.

(7) Connect drain hose to elbow in bottom of valve. Tighten nut that secures elbow.

(8) Tighten bolts that secure flange at inlet port of valve. Secure bolts with lock wire.

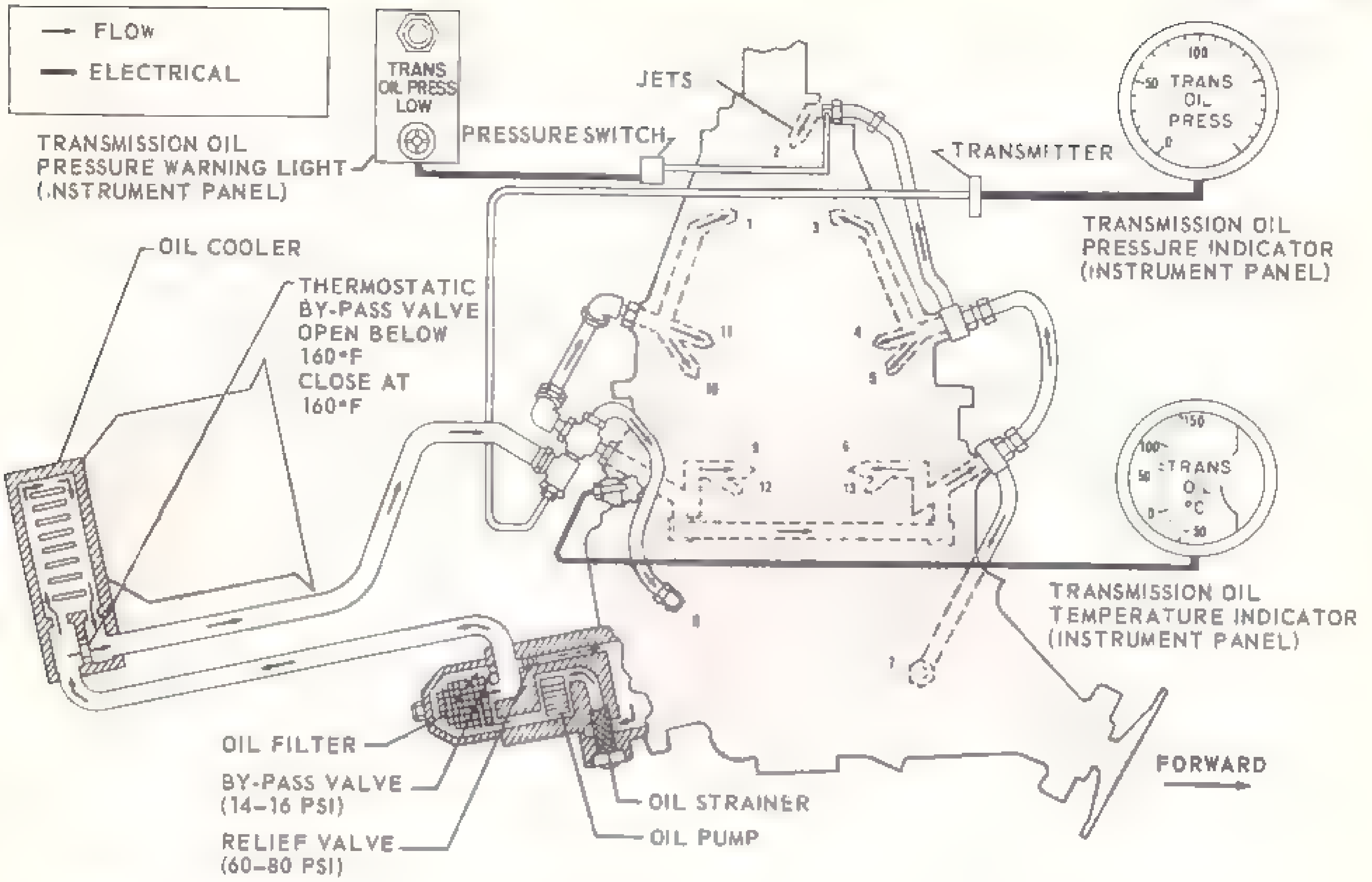
Warning

Make certain all electrical power is turned off.

(9) Connect electrical wiring to receptacle on valve.

(10) Move CLUTCH-OFF switch on control console to CLUTCH position. Check to see that manual toggle switch on valve has moved to right-hand position. Move switch to OFF position. Manual toggle switch on valve should be moved to left-hand position.

(11) Close nose doors.



1. To Upper Thrust Bearings
2. To Upper Thrust Bearings
3. To Upper Thrust Bearings
4. To Upper Section of Sun Gear
5. To Planetary System
6. To Lower Section of Sun Gear
7. To Main Bevel Gears
8. To Takeoff Bevel Gears
9. To Lower Section of Sun Gear
10. To Planetary System
11. To Upper Section of Sun Gear
12. To Lower Thrust Bearings
13. To Lower Thrust Bearings

Figure 7–10. Main transmission oil system schematic diagram (helicopters serial No. prior to 54-2882)

mission assembly and transmission support assemblies is gained by hinging down either or both of the service platforms.

Note

On helicopters serial No. 54-2882 and subsequent, an additional tube is installed on the oil separator to provide pressure lubrication of the sleeve bearing in the transmission lower housing. (See figure 7–11.)

Note

On helicopters serial No. 54-2882 and subsequent, the oil temperature bulb is installed in the strainer in the lower housing.

7–24. Troubleshooting. For troubleshooting procedures for the main transmission assembly, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low oil pressure	Insufficient oil in sump causing foaming	Fill main transmission with proper grade of oil. (Refer to paragraph 1–60.)
	Improper oil for temperature	Fill main transmission with proper grade of oil. (Refer to paragraph 1–60)
	Oil cooler valve stuck open	Notify direct support maintenance unit.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Relief valve stuck open	Notify direct support maintenance unit.
	Clogged strainer or filter	Clean strainer or filter. (Refer to paragraph 7–28.)
	Leakage in main transmission	Notify direct support maintenance unit.
	Clogging of oil cooler	Clean oil cooler. If normal pressure is not attained, notify direct support maintenance unit.
	Leakage in oil cooler	Notify direct support maintenance unit.
	Failure of oil cooler bypass valve	Notify direct support maintenance unit.
Gradual dropoff of oil pressure during flight	Bearings in gear box running hot.	Notify direct support maintenance unit.
	Internal leakage	Notify direct support maintenance unit.
	Clogged oil lines	Clean oil lines.
	Clogging of one or more jets in main transmission	Notify direct support maintenance unit.
High oil pressure	Improper setting of relief valve adjusting screw	Adjust oil pressure. (Refer to paragraph 7–32.)
	Relief valve stuck closed	Notify direct support maintenance unit.
	Improper oil for temperature	Fill main transmission with proper grade of oil. (Refer to paragraph 1–60.)
Discoloration of heat paint stripe	Overheating of bearing in area of discoloration	Notify direct support maintenance unit.
Fluctuating low oil pressure	Low oil level	Fill main transmission to correct level. (Refer to paragraph 1–60.)
	Improper oil for temperature	Fill main transmission with proper grade of oil. (Refer to paragraph 1–60.)
	Leaks in transmission or around seals	Notify direct support maintenance unit.
Excessive oil loss through breather	Excessive oil in transmission	Drain off excessive oil.
Metal particles in drained oil or on magnetic chip detector plug	Abnormal gear wear or failure of bearings	For complete information, refer to paragraphs 7–4 and 7–5.
Loss of oil	Leakage around rear cover gasket, rear accessory seals, main shaft seal, or lower housing spline shaft seals	Notify direct support maintenance unit.

7–25. *Operational Check.* The following procedures should be used if any doubt exists as to the serviceability of the main transmission assembly.

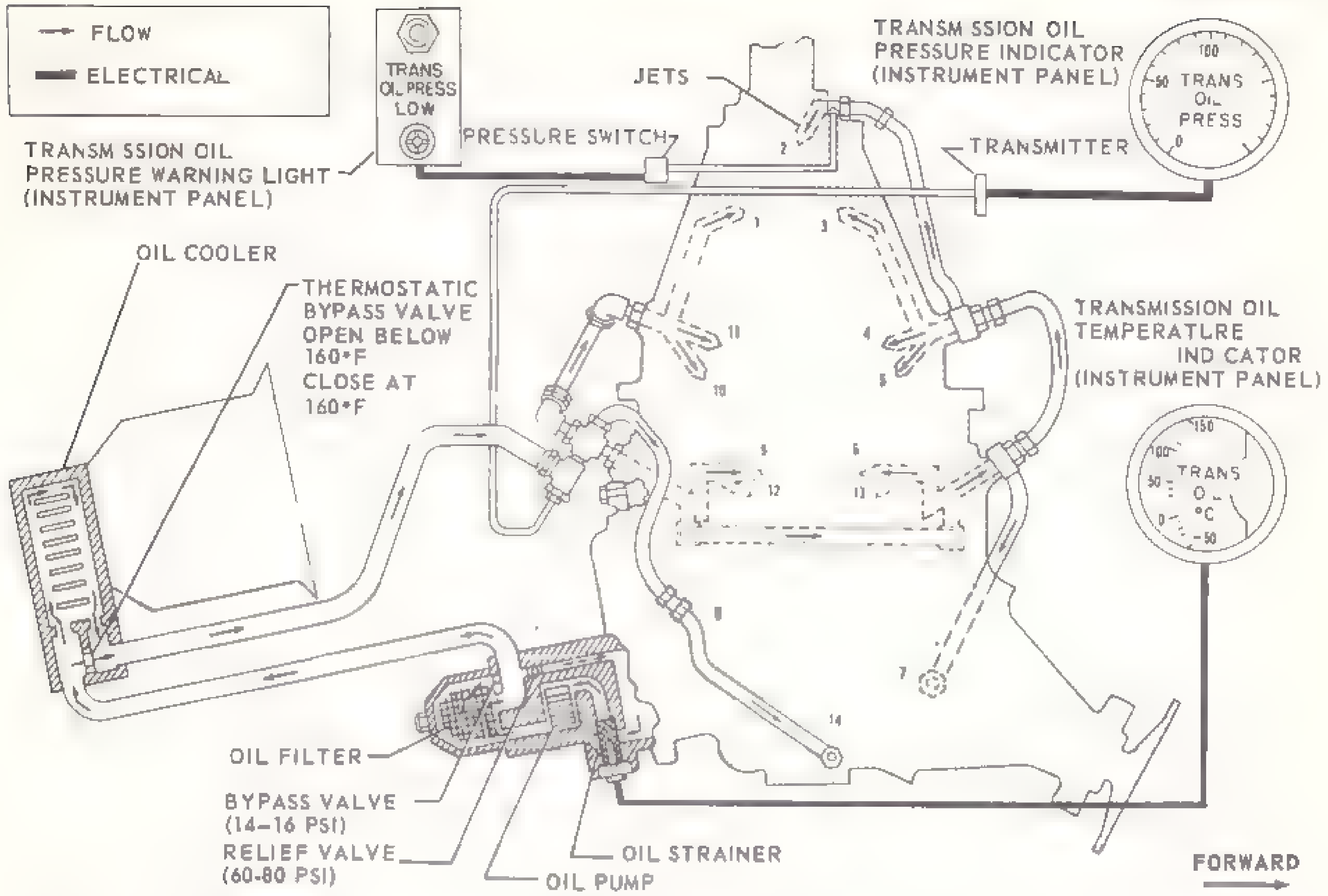
a. Drain main transmission and oil cooler. (Refer to paragraph 1–60.)

b. Flush main transmission, oil cooler, and lines thoroughly with lubricating oil (item 8, table 1–8).

c. Remove, clean, and reinstall oil filter, oil strainer screen, and magnetic chip detector plug.

d. Refill main transmission with oil. (Refer to paragraph 1–60.)

e. Run up engine in accordance with TM 55-1520-202-10 for 1 hour; stop engine and inspect oil strainer screen and magnetic chip detector plug. If amount of



1. To Upper Thrust Bearings
2. To Upper Thrust Bearings
3. To Upper Thrust Bearings
4. To Upper Section of Sun Gear
5. To Planetary System
6. To Lower Section of Sun Gear
7. To Main Bevel Gears
8. To Takeoff Bevel Gears
9. To Lower Section of Sun Gear
10. To Planetary System
11. To Upper Thrust Bearings
12. To Lower Thrust Bearings
13. To Lower Thrust Bearings
14. To Lower Bearing

Figure 7–11. Main transmission oil system schematic diagram (helicopters serial No. 54-2882 and subsequent)

metal particles has increased, main transmission should be changed; if amount of metal particles has decreased, continue main transmission in service, but continue inspection of main transmission as outlined in steps *f* through *i*.

f. After 5 hours of normal operation or during daily inspection, whichever comes first, drain main transmission and filter oil through cheesecloth or filter paper. Inspect residue on filter material for metal particles. Inspect magnetic chip detector plug for metal particles.

g. Clean and replace magnetic chip detector plug and refill with new oil. (Refer to paragraph 1–60.)

h. Repeat steps *f* and *g* above at 5-hour intervals or daily, whichever comes first, to determine whether the amount of metal particles has increased or decreased.

i. If amount of metal particles has increased, notify direct support maintenance unit. If amount of particles has decreased, main transmission may be continued in service.

7–26. Cleaning. Clean external surfaces of main transmission assembly with solvent (item 4, table 1–8). Wipe dry with a clean cloth.

7–27. Inspection. Inspect main transmission assembly for oil leakage and metal particle contamination as follows:

a. Leakage of the main transmission caused by a faulty seal, gasket, packing, or shim must not exceed the component maximum listed in table 7–4. Total leakage from all sources listed in table 7–4 must not exceed 5 cubic centimeters per hour. During a flight of 10 hours duration, total leakage, including loss from breather or vent openings, must not exceed the amount which causes the oil level of the main transmission to drop one-third of the distance from the FULL to the REFILL lines on the oil sight level gage.

b. Inspect main transmission assembly for metal particle contamination as follows:

(1) Hinge down service platforms to gain access to main transmission assembly.

Table 7–4. Main transmission assembly oil leakage

COMPONENT	MAXIMUM LEAKAGE PER COMPONENT
Seal	2 cubic centimeters per hour
Gasket	1 cubic centimeter per hour
Packing	1 cubic centimeter per hour
Shim	1 cubic centimeter per hour
Parting Flange	1 cubic centimeter per hour

(2) Unscrew magnetic chip detector plug from bottom of lower housing.

Note

The magnetic chip detector plug may now be inspected without the necessity of draining the main transmission assembly. (Refer to paragraphs 7–4 and 7–5.)

(3) Drain main transmission assembly oil into a receptacle.

(4) Screw magnetic chip detector plug into bottom of lower housing.

(5) Fill main transmission assembly with oil. (Refer to paragraph 1–60.)

(6) Close and secure service platforms.

7–28. *Repair or Replacement.* Replace magnetic chip detector plug, and remove, clean, and replace oil filter and strainer as follows:

a. Unsnap soundproofing panel in cabin ceiling under oil pump access panel for main transmission. Remove panel.

b. Cut lock wire and remove magnetic chip detector plug from drain unit in bottom of oil pump.

Note

The magnetic chip detector plug may now be inspected without the necessity of draining the main transmission.

c. Unscrew drain attachment and replace magnetic chip detector plug.

d. Remove nuts, leather gasket, and O-ring and remove oil filter cover. Remove spring and spacer. Remove retaining nut and disc stack, consisting of perforated tube discs and spacers, from oil pump cover. Remove discs and spacers from perforated tube.

e. Clean discs by washing in solvent (item 4, table 1–8). Remove lint or large dirt particles with a small, soft-bristle brush.

Caution

If metal particles are found in filter, investigate to determine source and cause. (Refer to paragraph 7–4.)

f. Position discs and spacers on collar of perforated tube, alternating discs, and spacers. Install retaining nut and tighten until discs cannot be turned by hand. Secure retaining nut with lock wire. Position perforated tube and disc stack in oil pump cover.

g. Install washer and spring. Place O-ring on oil filter cover and install oil filter cover, ring, gasket, and nuts.

Caution

Hold filter cover when tightening nuts to prevent damage to O-ring.

Check filter for possible leaks after ground run and after first flight.

h. To clean strainer, unscrew strainer from lower housing through access in cabin ceiling. Remove gasket. Clean strainer in solvent (item 4, table 1–8).

i. Install a new gasket and install strainer.

Caution

If metal particles are found in strainer, investigate to determine the source and cause. (Refer to paragraph 7–4.)

7–29. Oil Pump Cover Assembly. The oil pump cover assembly, mounted on the bottom of the lower housing, houses the oil pressure adjustment screw and is the mounting base for the oil filter. (Refer to paragraph 7–28 for servicing of oil filter.)

7–30. *Cleaning.* Clean external surfaces of oil pump cover assembly with solvent (item 4, table 1–8). Wipe dry with a clean cloth.

7–31. *Inspection.* Inspect oil pump cover assembly for cracks, warpage, evidence of leakage, and security.

7–32. *Adjustment.* Adjust main transmission oil pressure as follows:

a. Hinge down service platform on left side of helicopter.

b. Unscrew cap at bottom of oil pump cover at rear of main transmission.

c. Back off on adjusting screw inside cover to reduce oil pressure in system; tighten screw to increase oil pressure.

d. Close service platform.

e. Perform a ground runup in accordance with TM 55-1520-202-10. With main transmission oil temperature stabilized at 50°C to 100°C (122°F to 212°F) at 2500 engine rpm, an indication of 60 to 80 psi on transmission oil pressure gage is acceptable.

7–33. Oil Separator Installation (Helicopters Serial No. Prior to 54-2882). The main transmission oil separator installation consists primarily of several sections of tubing and fittings, an oil filler tube and cap, and the transmission oil temperature bulb. The tubing and fittings supply lubricating oil to the

main transmission internal pressure jets which, in turn, lubricate the gears and bearings; oil is supplied to the tubing by the main transmission oil pump through the oil cooler or the thermostatic bypass valve. The oil filler tube extends upward from a port on the left side of the transmission and is clamped to the main transmission support assembly. The temperature bulb, which is screwed into a receptacle at the rear of the main transmission, is connected by electrical wiring to the oil temperature indicator on the instrument panel. Access to the oil separator installation is gained by hinging down the service platform on each side of the helicopter. (See figures 7–10 and 7–12.)

7–34. Removal. a. Drain oil from main transmission. (Refer to paragraph 1–60.)

b. Hinge down service platforms on both sides of helicopter.

c. Disconnect electrical wiring (13, figure 7–12) from oil temperature bulb (15). Unscrew and remove oil temperature bulb and remove gasket.

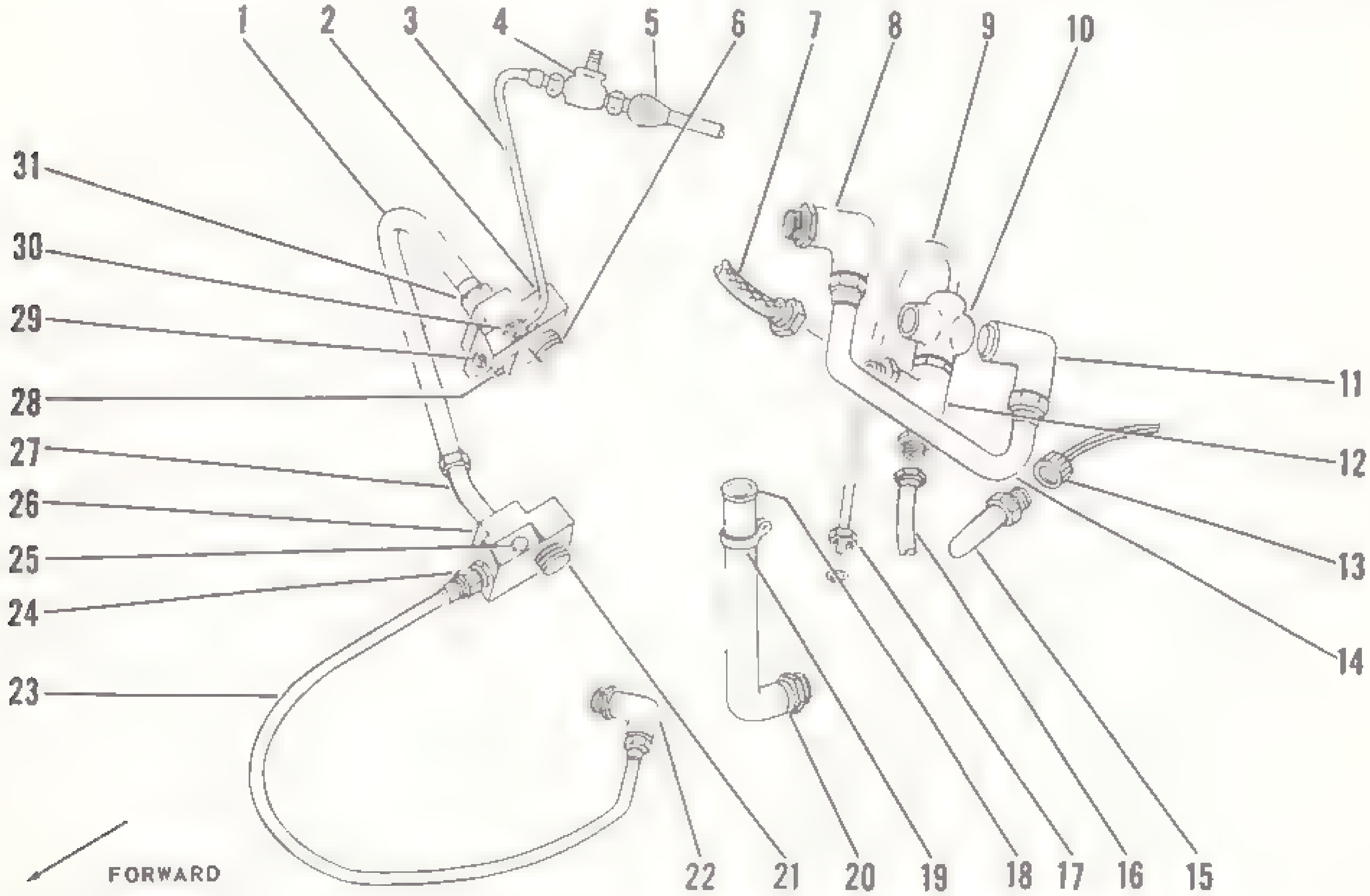
d. Disconnect and remove tube assembly (23) from elbow in port at lower left side of main transmission and from nipple (24) in lower fitting (26) at front of main transmission. Remove elbow, nut, and gasket (22) from main transmission and nipple (24) from fitting.

e. Disconnect and remove tube assembly (1) from elbow at lower fitting (26) and from union at upper fitting (2). Remove elbow, gasket, nut, and ring (27) from lower fitting and union and gasket (31) from upper fitting.

Note

On helicopters serial No. 54-2860 through 54-2881 an elbow, nut, and gasket are installed in place of union and gasket (31) in the upper fitting.

f. Disconnect and remove tube assembly (3) from union in upper fitting (2) and from restrictor in port at top of main transmission. Remove union and gasket (30) from upper fitting. Disconnect and remove oil



1. Tube Assembly	9. Tube Assembly	17. Union, Gasket	
2. Upper Fitting	10. Cross, Nut, Gasket, Ring	18. Filler Tube Cap	25. Plug
3. Tube Assembly	11. Elbow, Nut, Gasket	19. Clamp	26. Lower Fitting
4. Restrictor, Nut, Gasket	12. Tee, Union, Gasket	20. Oil Filler Tube	27. Elbow, Gasket, Nut, Ring
5. Oil Pressure Switch Line	13. Electrical Wiring	21. Bolt	28. Plug
6. Bolt	14. Tube Assembly	22. Elbow, Nut, Gasket	29. Plug
7. Oil Cooler Hose Line	15. Oil Temperature Bulb	23. Tube Assembly	30. Union, Gasket
8. Elbow, Nut, Gasket, Ring	16. Oil Pressure Indicator Line	24. Nipple	31. Union, Gasket

Figure 7–12. Main transmission oil separator installation (helicopters serial No. prior to 54-2882)

pressure switch line (5) from restrictor (4) and restrictor, nut, and gasket (4) from main transmission.

Note

On helicopters serial No. 54-2860 through 54-2881 an elbow, nut, and gasket are installed in place of union and gasket (30) in the upper fitting.

g. Remove bolts (6 and 21) that secure upper fitting (2) and lower fitting (26) to main transmission and remove fittings.

h. Disconnect and remove tube assembly (9) from union at lower right side of main transmission and from reducer in cross at rear of main transmission. Remove union and gasket (17) from main transmission and reducer and gasket from cross.

i. Disconnect and remove tube assembly (14) from elbow in cross and from elbow in main transmission port. Remove elbow, nut, and gasket (11) from cross and elbow, nut, gasket, and ring (8) from main transmission.

j. Disconnect oil cooler hose line (7) from reducer in tee at cross. Remove reducer and gasket from tee.

k. Disconnect oil pressure indicator line (16) from reducer in tee at cross. Remove reducer and gasket from tee.

l. Remove tee, union, and gasket (12) from cross. Remove cross, nut, gasket, and ring (10) from main transmission.

m. Release clamp (19) that secures oil filler tube (20) to main transmission support. Unscrew nut and coupling from elbow at main transmission and remove oil filler tube (20).

Note

If it is necessary to replace filler tube cap (18), loosen screw that holds clamp to filler tube, and slide cap off tube.

n. Remove plugs (25, 28, and 29) from upper and lower fittings (2 and 26).

o. Plug all main transmission lubrication ports to prevent entry of foreign material.

7–35. *Cleaning.* Clean all component parts of oil separator installation with solvent (item 4, table 1–8). Flush all tube assemblies and fittings with solvent and dry thoroughly with compressed air.

7–36. *Inspection. a.* Inspect all tube assemblies for dents, nicks, and possible cracks. Check tube assembly end fittings for security.

b. Inspect all fittings for dents, cracks, or possible leakage.

c. Replace any tube assemblies or fittings that have damaged threads.

d. Inspect all tube assemblies and fittings for foreign matter which might cause stoppage.

7–37. *Installation.* Install components of oil separator installation as follows:

Note

Blow all lines clear prior to installation.

Apply antiseize compound (item 54, table 1–8) to threads of all fittings and plugs.

a. Install plugs (25, 28, and 29, figure 7–12) in upper and lower fittings (2 and 26). Tighten to a torque of 95 to 110 inch-pounds.

b. Remove plugs from lubrication ports in main transmission.

c. Position oil filler tube (20) at elbow located on left side of main transmission and secure with nut and coupling. Secure oil filler tube to main transmission support with clamp (19).

Caution

Make certain a minimum of two threads is showing on the elbow outboard of the jam nut. If less than two threads are showing, the inboard end of the elbow may touch the bevel gear inside the main transmission.

Note

If the filler tube cap (18) was removed, slide clamp (19) over top of oil filler tube (20) and tighten screw.

d. Position and secure cross, nut, gasket, and ring (10) at port of main transmission. Install tee, union, and gasket (12) in cross.

e. Install reducer and gasket in tee in opening opposite the one leading to cross. Connect oil pressure indicator line (16) to reducer.

f. Install reducer and gasket in tee at cross. Connect oil cooler hose line (7) to reducer.

g. Install elbow, nut, gasket, and ring (8) in main transmission.

h. Install elbow, nut, and gasket (11) in cross and connect tube assembly (14) to elbow, nut, and gasket (11) and elbow, nut, gasket, and ring (8).

i. Install reducer and gasket in cross and connect tube assembly (9) to reducer. Install union and gasket (17) in port at lower right side of main transmission and connect tube assembly (9) to union.

j. Position upper fitting (2) and lower fitting (26) on main transmission and secure with bolts (6 and 21).

k. Install union and gasket (30) in upper fitting (2), and connect tube assembly (3) to union.

Note

On helicopters serial No. 54-2860 through 54-2881 an elbow, nut, and gasket are installed in place of the union and gasket (30) in the upper fitting.

l. Install restrictor, nut, and gasket (4) in port at top of main transmission and oil pressure switch line (5) to restrictor. Connect tube assembly (3) to restrictor.

m. Install union and gasket (31) in upper fitting (2) and elbow, gasket, nut, and ring (27) in lower fitting (26).

Note

On helicopters serial No. 54-2860 through 54-2881 an elbow, nut, and gasket are installed in place of the union and gasket (31) in the upper fitting.

n. Connect tube assembly (1) to elbow at lower fitting (27) and to union at upper fitting (31).

o. Install nipple (24) in lower fitting (26) and elbow, nut, and gasket (22) in port at lower left side of main transmission. Connect tube assembly (23) to nipple in lower fitting (26) and to elbow in main transmission.

p. Position gasket in oil temperature bulb receptacle of main transmission, and screw oil temperature bulb (15) into its receptacle. Connect electrical wiring (13) to bulb.

q. Service main transmission with lubricating oil (item 8, table 1–8). (Refer to paragraph 1–60.)

r. Close service platforms.

7–38. Oil Separator Installation (Helicopters Serial No. 54-2882 and Subsequent). The main transmission oil separator installation consists primarily of several sections of tubing and fittings and the oil filler tube and cap. The tubing and fittings supply lubricating oil to the main transmission internal pressure jets which, in turn, lubricate the gears and bearings; oil is supplied to the tubing by the main transmission oil pump, through the oil cooler or the thermostatic bypass valve. The oil separator installation on these helicopters is distinguished from that outlined in paragraph 7–33 by the installation of an additional tube which supplies pressure lubricating oil to the sleeve bearing in the main transmission lower housing. The oil filler tube extends upward from a port on the left side of the main transmission and is clamped to the main transmission support assembly. Access to the oil separator installation is gained by hinging down the service platform on each side of the helicopter. (See figures 7–11 and 7–13.)

7–39. Removal. a. Drain oil from main transmission. (Refer to paragraph 1–60.)

b. Hinge down service platforms on both sides of helicopter.

c. Disconnect and remove tube assembly (23, figure 7–13) from elbow in port at lower left side of main transmission and from nipple (24) in lower fitting (26) at front of main transmission. Remove elbow, nut, and gasket (21) from main transmission and nipple (24) from fitting.

d. Disconnect and remove tube assembly (1) from elbow at lower fitting (26) and from elbow at upper fitting (2). Remove elbow, gasket, nut, and ring (27) from lower fitting and elbow, nut, and gasket (31) from upper fitting.

e. Disconnect and remove tube assembly (3) from elbow in upper fitting and from restrictor in port at top of main transmission. Remove elbow, nut, and gasket (30) from fitting. Disconnect and remove oil pressure switch line (6) from restrictor and the restrictor, nut, and gasket (4) from the main transmission.

f. Remove bolts (5 and 22) that secure upper and lower fittings (2 and 26) to main transmission and remove fittings.

g. Disconnect and remove tube assembly (17) from elbow at main transmission lower housing and from tee at lower right side of main transmission. Remove elbow, unions, nut, and gaskets (16) from lower housing and union and gasket from tee.

h. Disconnect and remove tube assembly (9) from reducer in tee at lower right side of main transmission and from reducer in cross at rear of main transmission. Remove reducer and gasket from tee and reducer and gasket from cross. Remove tee, nut, and gaskets (15) from main transmission.

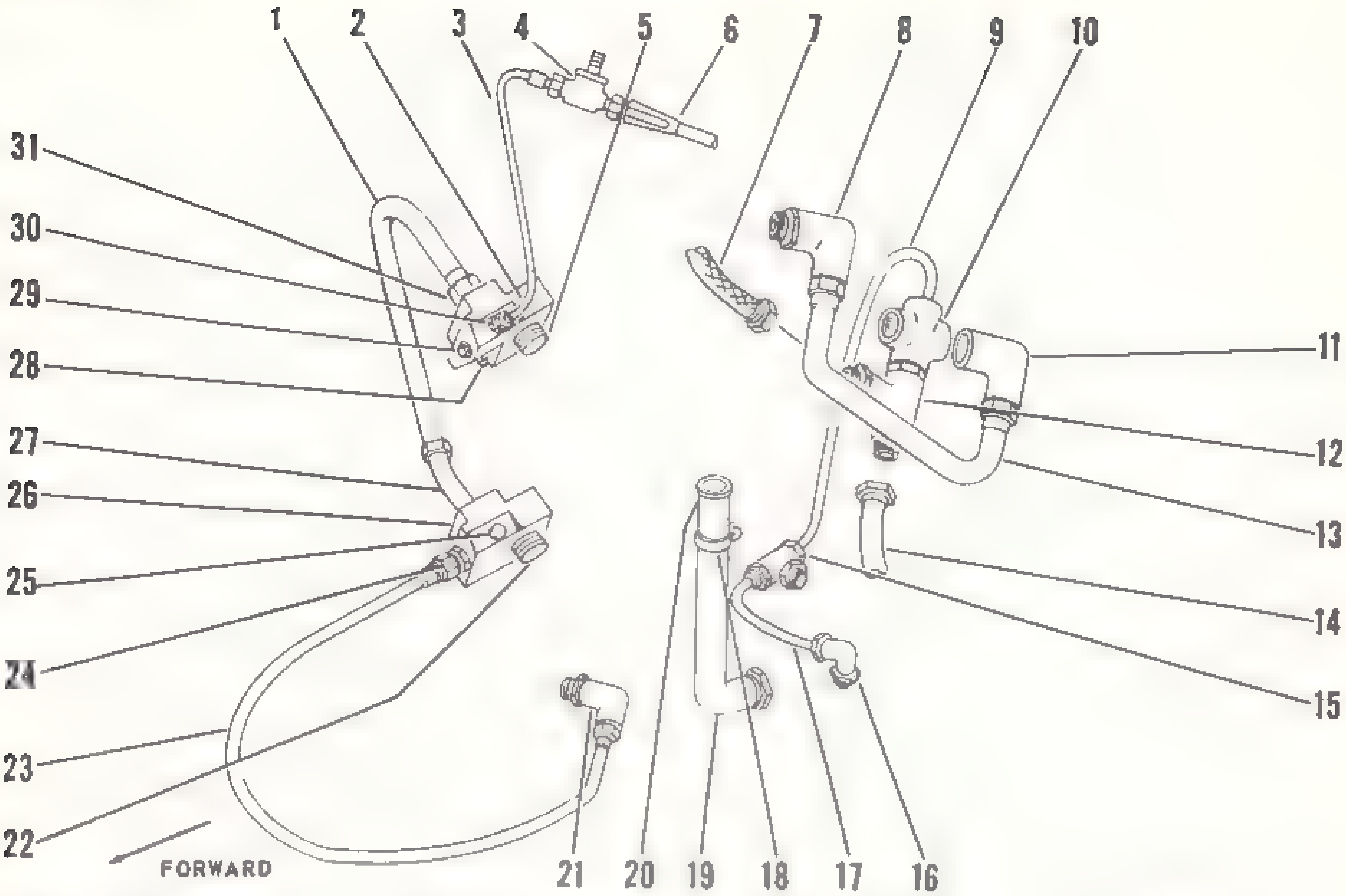
i. Disconnect and remove tube assembly (13) from elbow in cross and from elbow in main transmission port. Remove elbow, nut, and gaskets (11) from cross and elbow, nut, gasket, and ring (8) from main transmission.

j. Disconnect oil cooler hose line (7) from reducer in tee at cross. Remove reducer and gasket from tee.

k. Disconnect oil pressure indicator line (14) from reducer in tee at cross. Remove reducer and gasket from tee.

l. Remove tee, union, and gasket (12) from cross. Remove cross, nut, gasket, and ring (10) from main transmission.

m. Release clamp (18) that secures oil filler tube (19) to transmission support. Unscrew nut and coupling from elbow at main gear box and remove oil filler tube (19).



1. Tube Assembly
2. Upper Fitting
3. Tube Assembly
4. Restrictor, Nut, Gasket
5. Bolt
6. Oil Pressure Switch Line
7. Oil Cooler Hose Line
8. Elbow, Nut, Gasket, Ring
9. Tube Assembly
10. Cross, Nut, Gasket, Ring
11. Elbow, Nut, Gasket
12. Tee, Union, Gasket
13. Tube Assembly
14. Oil Pressure Indicator Line
15. Tee, Nuts, Gasket
16. Elbow, Unions, Nut, Gasket
17. Tube Assembly
18. Clamp
19. Oil Filler Tube
20. Filler Tube Cap
21. Elbow, Nut, Gasket
22. Bolt
23. Tube Assembly
24. Nipple
25. Plug
26. Lower Fitting
27. Elbow, Gasket, Nut, Ring
28. Plug
29. Plug
30. Elbow, Nut, Gasket
31. Elbow, Nut, Gasket

Figure 7–13. Main transmission oil separator installation (helicopters serial No. 54-2882 and subsequent)

Note

If it is necessary to replace filler tube cap (20), loosen screw that holds clamp to filler tube, and slide cap off tube.

n. Remove plugs (25, 28, and 29) from upper and lower fittings (2 and 26).

o. Plug all main transmission lubrication ports to prevent entry of foreign material.

7–40. Cleaning. Refer to paragraph 7–35.

7–41. Inspection. Refer to paragraph 7–36.

7–42. Installation. Install components of oil separator installation as follows:

Note

Blow all lines clear prior to installation.

Apply antiseize compound (item 54, table 1–8) to threads of all fittings and plugs.

a. Install plugs (25, 28, and 29, figure 7–13) in upper and lower fittings (2 and 26). Tighten to a torque of 95 to 110 inch-pounds.

b. Remove plugs from lubrication ports in main transmission.

c. Position oil filler tube (19) at elbow located on left side of main transmission and secure it with nut and coupling. Secure oil filler tube to main transmission support with clamp (18).

Caution

Make certain that a minimum of two threads is showing on the elbow outboard of jam nut. If less than two threads are showing, the inboard end of the elbow may touch the bevel gear inside the main transmission.

Note

If filler tube cap (20) was removed, slide clamp (18) over top of oil filler tube (19) and tighten screw.

d. Position and secure cross, nut, gasket, and ring (10) at port of main transmission. Install tee, union, and gasket (12) in cross.

e. Install reducer and gasket in tee in opening opposite the one leading to cross. Connect oil pressure indicator line (14) to reducer.

f. Install reducer and gasket in tee at cross. Connect oil cooler hose line (7) to reducer.

g. Install elbow, nut, and gasket (11) in cross and connect tube assembly (13) to elbow.

h. Install elbow, nut, gasket, and ring (8) in main transmission port adjacent to cross. Connect tube assembly (13) to elbow.

i. Install reducer and gasket in cross and connect tube assembly (9) to reducer. Install tee, nut, and gasket (15) in port at lower right side of main transmission and install reducer and gasket in tee. Connect tube assembly (9) to reducer.

j. Install union and gasket in tee at lower right side of main transmission lower housing, and elbow, union, nut, and gasket (16) in port of main transmission lower housing. Connect tube assembly (17) to tee and to elbow.

k. Position upper and lower fittings (2 and 26) on main transmission and secure them with bolts (5 and 22).

l. Install restrictor, nut, and gasket (4) in port at top of main transmission and oil pressure switch line (6) to restrictor. Connect tube assembly (3) to restrictor.

m. Install elbow, nut, and gasket (30) in upper fitting (2) and elbow, gasket, nut, and ring (27) in lower fitting (26).

n. Connect tube assembly (3) to elbow, nut, and gasket (30).

o. Connect tube assembly (1) to elbow at the lower fitting (26) and to the elbow at the upper fitting (2).

p. Install nipple (24) in lower fitting (26) and elbow, nut, and gasket (21) in port at lower left side of main transmission. Connect tube assembly (23) to nipple in lower fitting (26) and to elbow in main transmission.

q. Service main transmission with lubricating oil (item 8, table 1—8). (Refer to paragraph 1—60.)

r. Close service platforms.

7—43. Oil Cooler and Blower Assembly (Helicopters Serial No. Prior to 54-892). The oil cooler and blower assembly (figures 7—14 and 7—15) is located aft of the main transmission on the transmission deck. The assembly consists of a fan assembly, duct, and an oil cooler. The fan is pulley-driven off the tail rotor drive shaft by three matched vee belts. Outside air for cooling enters the canopy where it is drawn into the blower and rammed through the cooler. If the temperature of the oil is greater than 71°C (160°F), a thermostatic valve in the oil cooler allows the heated oil to flow through the cooler until the temperature is reduced to the temperature of the valve setting. If the temperature of the oil is less than 71°C (160°F), a valve in the system allows the oil to bypass the oil cooler. The oil cooler and blower assembly may be removed and installed as a unit. Access to the unit is gained by hinging down the service platforms and removing the aft canopy sections.

7—44. Troubleshooting. For troubleshooting procedures for the main transmission oil cooler and blower assembly, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Oil not cooling properly	Loose pulley belts	Adjust belts to obtain proper deflection and tension. (Refer to paragraph 7—47.)
	Thermostatic valve in oil cooler not operating at correct temperature	Notify direct support maintenance unit.
	Clogged oil cooler	Notify direct support maintenance unit.
Overcooling of oil	Thermostatic valve in oil cooler not operating at correct temperature	Notify direct support maintenance unit.
Unusual vibration and noise from oil cooler blower (oil temperature may run high)	Leakage in oil cooler	Notify direct support maintenance unit.
	Defective bearing in blower	Notify direct support maintenance unit.

7—45. Inspection. Inspect main transmission oil cooler and blower assembly for loose pulley belts, unusual vibration and noises, and leaking lines. Check blower fan for balance, check blower for overheating, and inspect oil cooler and blower for overall operating conditions.

Figure 7–14. Main transmission oil cooler and blower assembly

7–46. *Repair or Replacement.* Repair of the oil cooler and blower assembly is limited to the replacement of the pulley belts. Replace pulley belts that are broken, tattered, badly worn, or stretched as follows:

Note

Always replace pulley belts in matched sets of three.

a. Hinge down service platform and remove skin assemblies over oil cooler and blower assembly (26, figure 7–15) by unlocking Camloc fasteners.

b. Support fan assembly (28) with transmission support, part No. S1670-10624, FSN 1730-633-0933.

c. Loosen bolts, washers, and nuts (27) which secure adjusting plate (17) and block (24) to front support (15); lower forward end of oil cooler and blower assembly (26) in slotted holes of front support; and remove pulley belts (2) off driven pulley (5).

d. Remove bolts, washers, and nuts (31) that secure rubber coupling (8) and shims (30) to driving pulley hub flange at aft end of second section of tail rotor drive shaft. Remove shims.

Note

Tag position of shims for reinstallation.

e. Remove bolts, washers, and nuts (7) that secure rubber coupling (8) to forward flange (9) of third section of tail rotor drive shaft. Remove rubber coupling.

f. Remove old pulley belts (2) and replace with a matched set of pulley belts. Place pulley belts through opening allowed by removal of rubber coupling (8) and position pulley belts on driving pulley (1).

g. Install rubber coupling (8) on flange (9) on forward end of third section of tail rotor drive shaft. Secure with bolts, washers, and nuts (7) and tighten to a torque of 50 to 55 inch-pounds.

Note

Install bolts with heads forward.

h. Insert shims (30) required between rubber coupling (8) and driving pulley hub flange and install bolts, washers, and nuts (31) that secure rubber coupling to flange of the driving pulley hub. Tighten nuts to a torque of 50 to 55 inch-pounds.

Note

Install bolts with heads forward.

i. Loop pulley belts (2) over driving pulley (1) and driven pulley (5). Adjust pulley belts and complete reassembly in accordance with instructions in paragraph 7–47.

7–47. *Adjustment.* To correct forward and aft misalignment of the driving and driven pulleys (1 and 5, figure 7–15), proceed as follows:

a. Hinge down service platforms and remove skin assemblies over oil cooler and blower assembly (26, figure 7–15) by unlocking Camloc fasteners.

b. Support fan assembly (28) with transmission support, part No. S1670-10624, FSN 1730-633-0933.

c. Loosen bolts, washers, and nuts (27) which secure adjusting plate (17) and block (24) to front support (15); lower forward end of oil cooler and blower assembly (26) in slotted holes of front support; and remove pulley belts (2) off driven pulley (5).

d. Remove nut (3) and washer (4) securing driven pulley (5). Remove driven pulley, key (29), and shims (6) from fan shaft. Remove or add shims (6) to correct forward or aft misalignment.

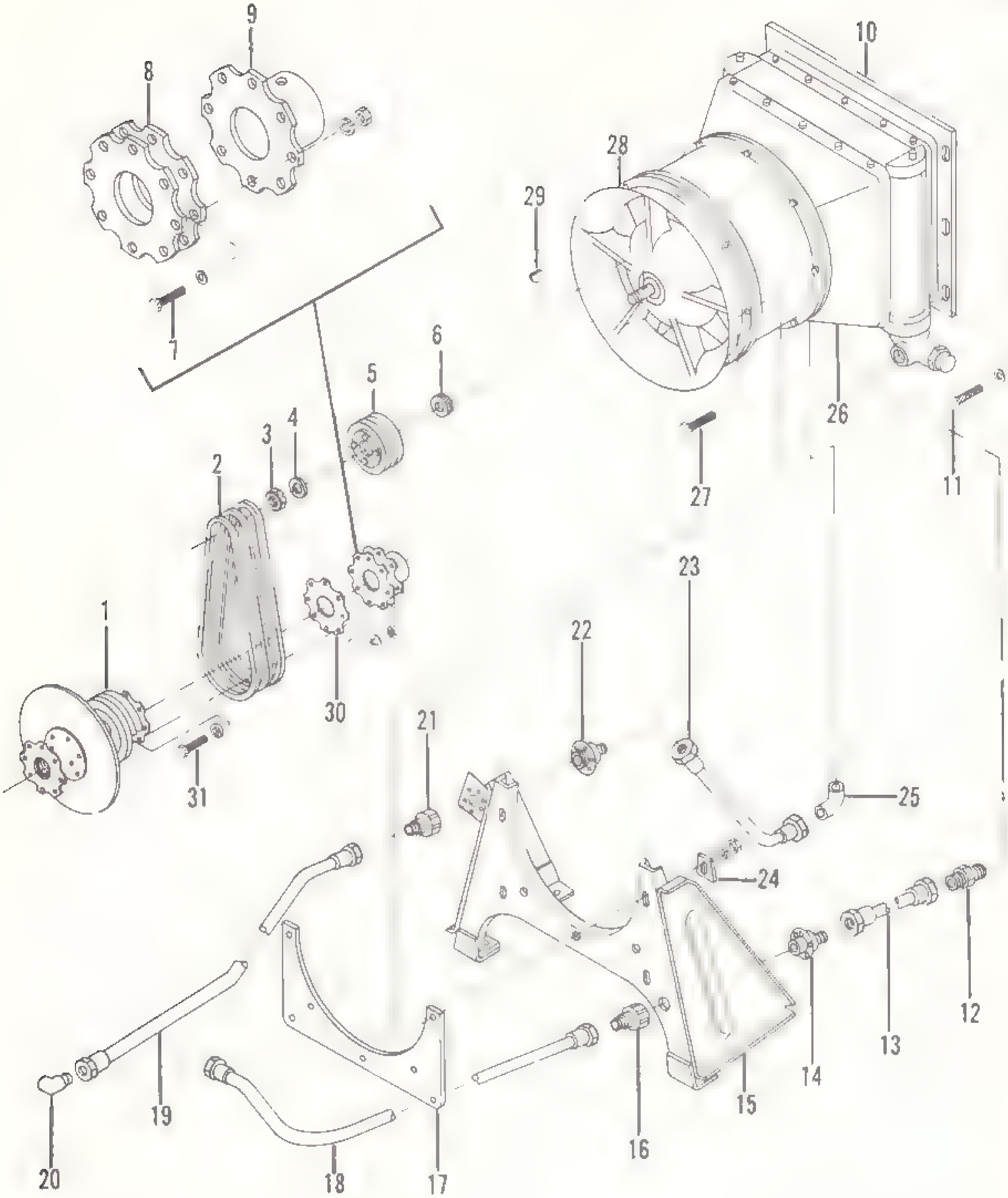
e. Place shims (6) on fan shaft and install key (29). Install driven pulley (5), washer (4), and nut (3) on fan shaft. Tighten nut to a torque of 165 to 195 inch-pounds.

f. Place pulley belts (2) in proper position on driving pulley (1) and driven pulley (5).

g. Position transmission support, part No. S1670-10624, FSN 1730-633-0933, under fan assembly (28).

h. Loosen bolts, washers, and nuts (27) which secure adjusting plate (17) and blocks (24) to oil cooler and blower assembly (26) front support (15), and loosen screws (11) attaching oil cooler radiator support (10) to bulkhead.

i. Raise oil cooler and blower assembly (26) until pulley belts (2) deflect 1/2 to 3/4 inch midway between



1. Driving Pulley
2. Pulley Belts
3. Nut
4. Washer
5. Driven Pulley
6. Shims
7. Bolt, Washers and Nut
8. Rubber Coupling
9. Flange
10. Radiator Support
11. Screw
12. Nipple
13. Hose Assembly
14. Coupling Fitting
15. Front Support
16. Coupling
17. Adjusting Plate
18. Hose Assembly
19. Hose Assembly
20. Elbow Fitting
21. Coupling
22. Coupling Fitting
23. Hose Assembly
24. Block
25. Elbow Fitting
26. Oil Cooler and Blower Assembly
27. Bolt, Washer and Nut
28. Fan Assembly
29. Key
30. Shim
31. Bolt, Washers and Nut

Figure 7–15. Oil cooler and blower assembly components (helicopters serial No. prior to 54-892)

driving and driven pulleys (1 and 5) with a load of 10 ± 1/2 pound. Tighten adjustment bolts and screws to a torque of 100 to 140 inch-pounds.

Note

Check pulley bolts for tightness after 3 hours of flight. Readjust as necessary.

7–48. *Hose Assemblies and Fittings.* Four hose assemblies (13, 18, 19, and 23, figure 7–15) carry oil from the main oil pump to the oil cooler and back to the oil inlet fitting on the main transmission. The hose assemblies are attached together by coupling fittings (14 and 22) at the front support (15).

a. Removal. (1) Drain oil from main transmission and oil cooler and blower assembly as necessary.

(2) Disconnect couplings (16 and 21, figure 7–15) from coupling fittings (14 and 22).

(3) Disconnect hose assembly (19) from oil pump outlet elbow fitting (20). Remove hose assembly and remove coupling (21) from hose assembly. Install dust plugs to prevent entry of foreign material.

(4) Remove elbow fitting (20) from oil pump and plug opening to prevent entry of foreign material.

(5) Disconnect hose assembly (18) from inlet fitting. Cap inlet fitting to prevent entry of foreign material. Remove hose assembly and remove coupling (16) from hose assembly. Install dust plugs to prevent entry of foreign material.

(6) Disconnect hose assembly (13) from coupling fitting (14) and nipple (12). Remove hose assembly and install dust plugs to prevent entry of foreign materials.

(7) Disconnect hose assembly (23) from coupling fitting (22) and elbow fitting (25). Remove hose assembly and install dust plugs to prevent entry of foreign material.

(8) Remove elbow fitting (25) and nipple (12) from oil cooler radiator and install dust plugs to prevent entry of foreign material.

(9) Remove attaching screws securing coupling fittings (14 and 22) to front support (15). Remove coupling fittings.

b. Cleaning. Clean and flush oil cooler hose assemblies and fittings with solvent (item 4, table 1–8).

c. Inspection. (1) Inspect hose assemblies for cuts, frayed or worn surfaces, and evidence of leakage.

(2) Inspect all fittings for hairline cracks, evidence of overtightening, or crossed threads.

(3) Inspect all fittings and couplings for damaged threads.

d. Installation. (1) Remove dust plugs from oil cooler radiator, and install nipple (12, figure 7–15) and elbow fitting (25) in position.

(2) Install and secure coupling fittings (14 and 22) to front support (15) with attaching screws.

(3) Remove dust plug from transmission oil pump outlet opening and install elbow fitting (20).

(4) Remove dust plugs. Install hose assembly (13) and connect and tighten securely to nipple (12) and coupling fitting (14).

(5) Remove dust plugs. Install hose assembly (23) and connect and tighten securely to elbow fitting (25) and coupling fitting (22).

(6) Remove dust plugs from hose assemblies (18 and 19). Install couplings (16 and 21) on aft ends of hose assemblies.

(7) Connect coupling (21) to coupling fitting (22), and connect forward end of hose assembly (19) to oil pump outlet elbow fitting (20). Tighten hose fittings securely.

(8) Connect aft end of hose assembly (18) coupling (16) to fitting coupling (14).

(9) Remove dust cap from oil inlet fitting and connect forward end of hose assembly (18). Tighten hose fitting securely.

7–49. Oil Cooler and Blower Assembly (Helicopters Serial No. 54-892 and Subsequent). The oil cooler and blower assembly (figures 7–14 and 7–16) is located aft of the main transmission on the transmission deck. The assembly consists of a fan, duct, and an oil cooler. The fan is pulley-driven off the tail rotor drive shaft by two matched vee belts. Outside air for cooling enters the canopy where it is drawn into the fan and rammed through the cooler. If the temperature of the oil is greater than 71°C (160°F), a thermostatic valve in the oil cooler allows the heated oil to flow through the cooler until the temperature is reduced to the temperature of the valve setting. If the temperature of the oil is less than 71°C (160°F), a valve in the system allows the oil to bypass the oil cooler. The oil cooler and blower may be removed and reinstalled as a unit. Access to the unit is gained by hinging down the service platforms and removing the aft canopy sections.

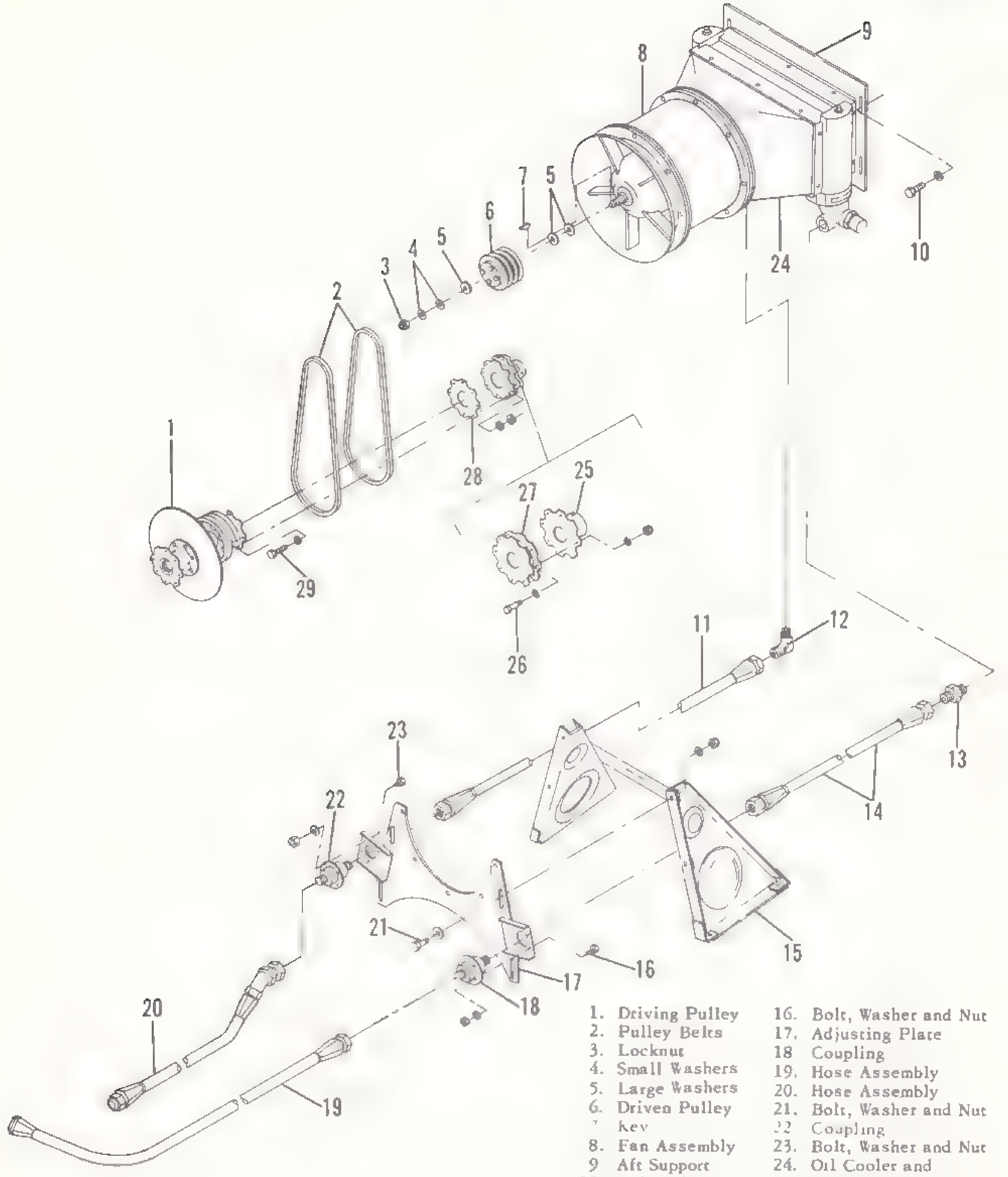
7–50. *Troubleshooting.* (Refer to paragraph 7–44.)

7–51. *Inspection.* (Refer to paragraph 7–45.)

7–52. *Repair or Replacement.* Repair of the oil cooler and blower assembly is limited to the replacement of the pulley belts. Replace pulley belts that are broken, tattered, badly worn, or stretched as follows:

Note

Always replace pulley belts in a matched set of two.



1. Driving Pulley
2. Pulley Belts
3. Locknut
4. Small Washers
5. Large Washers
6. Driven Pulley
7. Key
8. Fan Assembly
9. Aft Support
10. Bolt and Washer
11. Hose Assembly
12. Elbow Fitting
13. Nipple Fitting
14. Hose Assembly
15. Front Support
16. Bolt, Washer and Nut
17. Adjusting Plate
18. Coupling
19. Hose Assembly
20. Hose Assembly
21. Bolt, Washer and Nut
22. Coupling
23. Bolt, Washer and Nut
24. Oil Cooler and Blower Assembly
25. Flange
26. Bolt, Washer and Nut
27. Rubber Coupling
28. Shim
29. Bolt, Washer and Nut

Figure 7–16. Oil cooler and blower assembly (helicopter serial No. 54-892 and subsequent)

a. Hinge down service platform and remove skin assemblies over oil cooler and blower assembly (24, figure 7—16) by unlocking Camloc fasteners.

b. Support fan assembly (8) with transmission support, part No. S1670-10624, FSN 1730-633-0933.

c. Loosen bolts, washers, and nuts (21) which secure adjusting plate (17) to front support (15), lower forward end of fan assembly (8), and pull pulley belts (2) off driven pulley (6).

d. Remove bolts, washers, and nuts (29) that secure rubber coupling (27) and shims (28) to driving pulley hub flange at aft end of second section of tail rotor drive shaft. Remove shims.

Note

Tag position of shims for reinstallation.

e. Remove bolts, washers, and nuts (26) that secure rubber coupling (27) to front flange (25) of third section of tail rotor drive shaft. Remove rubber coupling.

f. Remove old pulley belts (2) and replace with a matched set of pulley belts. Place pulley belts through opening allowed by removal of rubber coupling (27), and position pulley belts onto driving pulley (1).

g. Install rubber coupling (27) onto flange (25) on forward end of third section of tail rotor drive shaft. Secure with bolts, washers, and nuts (26). Tighten nuts to a torque of 50 to 55 inch-pounds.

Note

Install bolts with heads forward.

h. Insert shims (28) required between rubber coupling (27) and driving pulley hub flange and install bolts, washers, and nuts (29) that secure rubber coupling to flange of driving pulley hub. Tighten nuts to a torque of 50 to 55 inch-pounds.

Note

On helicopters serial No. 56-4313 and subsequent, a full set of four shims must be installed at aft end of the second section of the tail rotor drive shaft. After shimming as required, place the unused shims inside the rubber coupling under washers and nuts.

Note

Install bolts with heads forward.

i. Loop pulley belts (2) over driving pulley (1) and driven pulley (6). Adjust pulley belts and complete reassembly in accordance with instructions in paragraph 7—53.

7—53. Adjustment. To correct forward and aft misalignment of driven pulley (6, figure 7—16) proceed as follows:

a. Hinge down service platform and remove skin assemblies over oil cooler and blower assembly (24, figure 7—16) by unlocking Camloc fasteners.

b. Support fan assembly (8) with transmission support, part No. S1670-10624, FSN 1730-633-0933.

c. Loosen bolts, washers, and nuts (21) which secure adjusting plate (17) to front support (15), lower forward end of fan assembly (8), and pull pulley belts (2) off driven pulley (6).

d. Remove locknut (3), small washer (4), large washer (5), driven pulley (6), and key (7).

e. Position two of four larger washers (5) on fan shaft. Install key (7), driven pulley (6), and other two large washers (5). Secure driven pulley with a small washer (4) and locknut (3). Tighten locknut to a torque of 165 to 195 inch-pounds.

f. Place pulley belts (2) in proper position on driving pulley (1) and driven pulley (6).

g. Position transmission support, part No. S1670-10624, FSN 1730-633-0933, under fan assembly (8).

h. Loosen bolts, washers, and nuts (21) which secure adjusting plate (17) to front support (15) and bolts and washers (10) attaching aft support (9) to bulkhead.

i. Using support in step *g*, raise oil cooler and blower assembly (24) until pulley belts (2) deflect 1/2 to 3/4 inch midway between driving and driven pulleys (1 and 6) with a load of 10 ± 1/2 pound. Tighten adjustment bolts and washers (10) and bolts, washers, and nuts (21) to a torque of 100 to 140 inch-pounds.

Note

Check pulley belts for tightness after 3 hours of flight. Readjust as necessary.

7—54. Hose Assemblies and Fittings. Four hose assemblies (11, 14, 19, and 20, figure 7—16) carry oil from the oil pump to the oil cooler and back to the oil inlet fitting on the main transmission. The hose assemblies are attached together by couplings (18 and 22) at the adjusting plate (17).

a. Removal. (1) Drain oil from main transmission and oil cooler and blower assembly as necessary.

(2) Disconnect quick disconnect fittings of hose assemblies (19 and 20, figure 7—16) from couplings (18 and 22) at adjusting plate (17).

(3) Remove hose clamp securing hose assembly (20) and disconnect forward end of hose assembly from oil pump outlet fitting. Remove hose assembly and remove quick disconnect fitting from hose assembly. Install dust plugs in hose assembly and cap oil pump outlet fitting to prevent entry of foreign material.

(4) Disconnect forward end of hose assembly (19) from oil inlet fitting. Remove hose assembly and remove quick disconnect fitting from hose assembly. Install dust plugs in hose assembly and cap oil inlet fitting to prevent entry of foreign material.

(5) Disconnect hose assembly (11) from elbow fitting (12) and coupling (22). Remove hose assembly and install dust plugs to prevent entry of foreign material.

(6) Remove bolts, washers, and nuts (23) securing coupling (22). Remove coupling.

(7) Disconnect hose assembly (14) from nipple fitting (13) and coupling (18). Remove hose assembly.

(8) Remove bolts, washers, and nuts (16) securing coupling (18). Remove coupling.

(9) Remove elbow fitting (12) and nipple fitting (13) from oil cooler radiator. Install dust plugs in fitting port openings to prevent entry of foreign material.

b. Cleaning. Refer to paragraph 7—48*b*.

c. Inspection. Refer to paragraph 7—48*c*.

d. Installation. (1) Remove dust plugs from oil cooler radiator, and install elbow fitting (12, figure 7—16) and nipple fitting (13) in position.

(2) Install and secure couplings (18 and 22) to adjusting plate (17) with bolts, washers, and nuts (16 and 23).

(3) Remove dust plugs from hose assembly (11), and install and connect hose assembly to elbow fitting (12) and coupling (22). Tighten hose fittings securely.

(4) Remove dust plugs from hose assembly (14), and install and connect hose assembly to nipple fitting (13) and coupling (18). Tighten hose fittings securely.

Caution

Be careful not to twist hose assemblies (11 and 14) when tightening hose fittings in steps (3) and (4).

(5) Remove dust plugs from hose assembly (20) and install quick disconnect fitting on aft end of hose assembly.

(6) Remove dust cap from oil pump outlet fitting and connect forward end of hose assembly (20). Tighten hose fitting securely.

(7) Connect quick disconnect fitting on aft end of hose assembly (20) to coupling (22). Secure hose clamp and tighten quick disconnect fitting securely.

(8) Remove dust plugs from hose assembly (19) and install quick disconnect fitting on aft end of hose assembly.

(9) Remove dust cap from transmission oil inlet fitting and connect forward end of hose assembly (19). Tighten hose fitting securely.

(10) Connect quick disconnect fitting on aft end of hose assembly (19) to coupling (18). Tighten quick disconnect fitting securely.

Section V Tail Rotor Drive Shaft

7—55. Description. The tail rotor drive shaft (figure 7—17) consists of two main sections, the fuselage section, and the pylon section. The fuselage section extends from the rear accessory cover of the main transmission to the tail rotor drive shaft disconnect coupling. The pylon section extends from the disconnect coupling to the intermediate gear box, and from the intermediate gear box to the tail rotor gear box.

7—56. Tail Rotor Drive Shaft — Fuselage Section. The fuselage section of the tail rotor drive shaft is divided into four sections, each with its own rubber couplings, hubs, rubber-mounted support bearings, and attachment flanges. The first section, which is above the transmission deck, consists of a drive shaft, with a rubber coupling at the forward end, and two flanges. There is a rubber coupling between the first and second sections of the shaft. The second section, also located above the transmission deck, contains a rotor brake which is composed of four hydraulic brake halves and a rotor brake disc. The second section also contains an oil cooler and blower pulley hub with attached pulley, a rubber coupling, and a drive shaft and support bearing. The third section, which extends from above the transmission deck through the cabin and electronics compartments to the tail cone, consists of a drive shaft with three support bearings and a flange and rubber coupling at the aft end. The fourth section extends through the tail cone and is made up of a flange, a shaft with three support bearings, and an input coupling at the rear of the tail cone section. On helicopters serial No. prior to 55-4473 the fourth section of the tail rotor drive shaft is equipped with four support bearings. The second and third sections of the drive shaft are joined on installation by a rubber coupling, shims, and an attachment

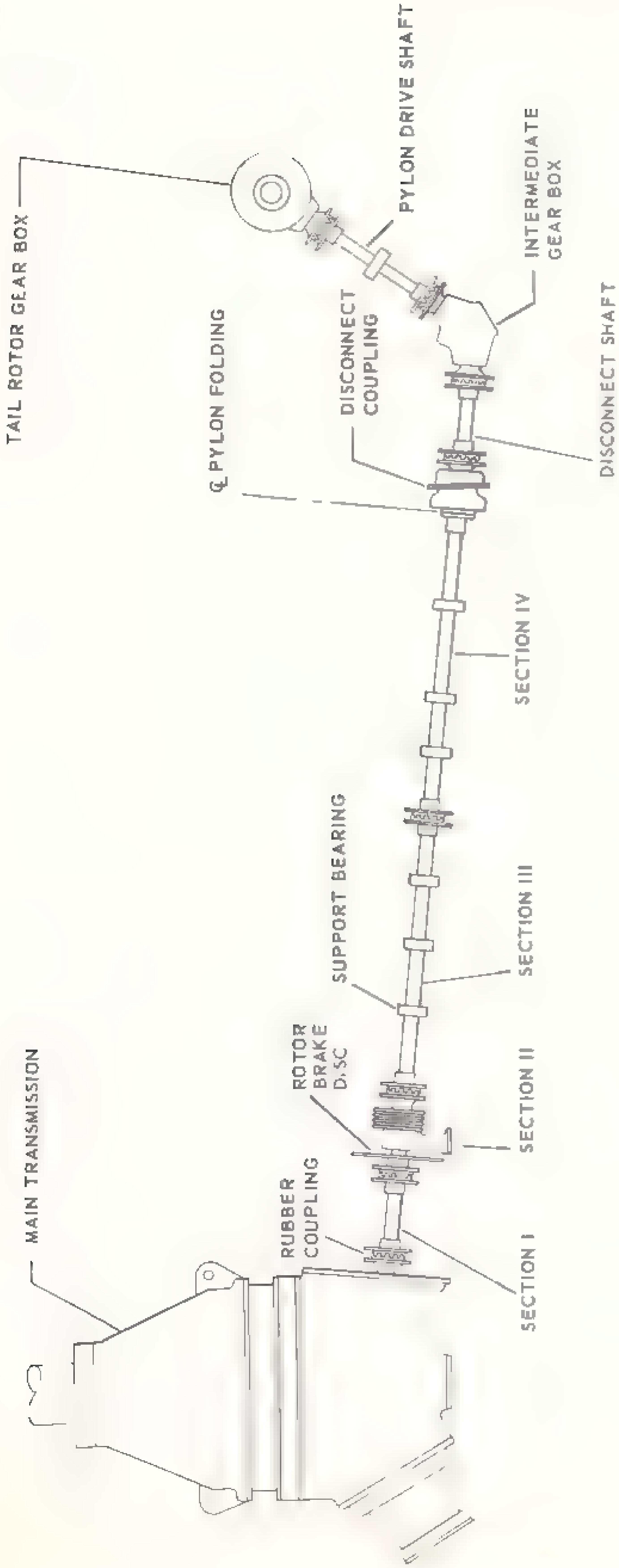


Figure 7—17. Tail rotor drive shaft

flange which fits over, and is bolted to, the forward end of the third section shaft. Access to the first section is gained by hinging down the main transmission service platforms. Access to the second section of the tail rotor drive shaft is gained by removing the skin assemblies aft of the service platforms. Access to the third section is gained by removing the louvered Fiberglas fairing at the rear of the skin assemblies and removing the tail rotor drive shaft covers located in the cabin and electronics compartments. The fourth section is exposed in the tail cone section.

7–57. *Drive Shaft.* The primary purpose of the tail rotor drive shaft is to transmit engine torque for driving the tail rotor, but it also provides an attachment for the main rotor brake disc and a pulley for the main transmission oil cooler blower.

a. Cleaning. Clean surface of drive shaft with solvent (item 4, table 1–8). Wipe dry with a clean cloth.

b. Inspection. Inspect drive shaft for scratches, scores, nicks, gouges, and dents. Check shaft for security in support bearings.

7–58. *Drive Shaft Rubber Couplings.* The tail rotor drive shaft rubber couplings transmit torque, absorb main transmission shock and vibration, and adjust for permissible minor misalignment of the tail rotor drive shaft components. Each rubber coupling is composed of two metal jaws with interlocking vanes joined and separated by molded rubber segments located between the vanes. The rubber segments located between the straight sides of the vanes are brick-shaped and bonded to both vanes, one from each jaw. The rubber segments located between the tapered sides of the vanes are separators and are bonded to only one of the adjacent vanes. The two types of rubber segments occur alternately around the rubber coupling.

a. Cleaning. Clean exterior surfaces of rubber couplings with a cloth. Use a soft-bristle brush if necessary to remove foreign matter.

b. Inspection. (1) Perform fluorescent penetrant inspection on metal parts of rubber couplings in accordance with Military Specification MIL-I-6866.

(2) Inspect rubber couplings for excessive elongation of bolt holes.

Note

In the following steps the term segment shall signify one rubber segment and its one or two bonded surfaces, according to its type; the term face shall signify one of the unbonded surfaces of the rubber segment.

(3) With aid of blunt instrument, which will not cut, gouge, or otherwise damage rubber segments, visually inspect rubber couplings to determine depth and extent of rubber bond separations from vanes. (See figure 7–18.)

Note

Be careful not to scratch the protective finish of the metal jaws of the coupling. A piece of phenolic with a rounded tip makes a suitable inspection tool.

(4) Each of the two bonded surfaces of a rubber segment has four edges, formed at its intersection with the four faces of the rubber segment. A bond separation may occur at any of these eight edges of the segment.

Note

A single bond separation extending over two faces of a segment at these edges shall be considered as two separations, and their individual depth shall be measured from the face to which each portion is related.

(5) With aid of blunt instrument, visually inspect faces of rubber segment for cuts, tears, or other defects that may be present, and determine their depth and extent.

Note

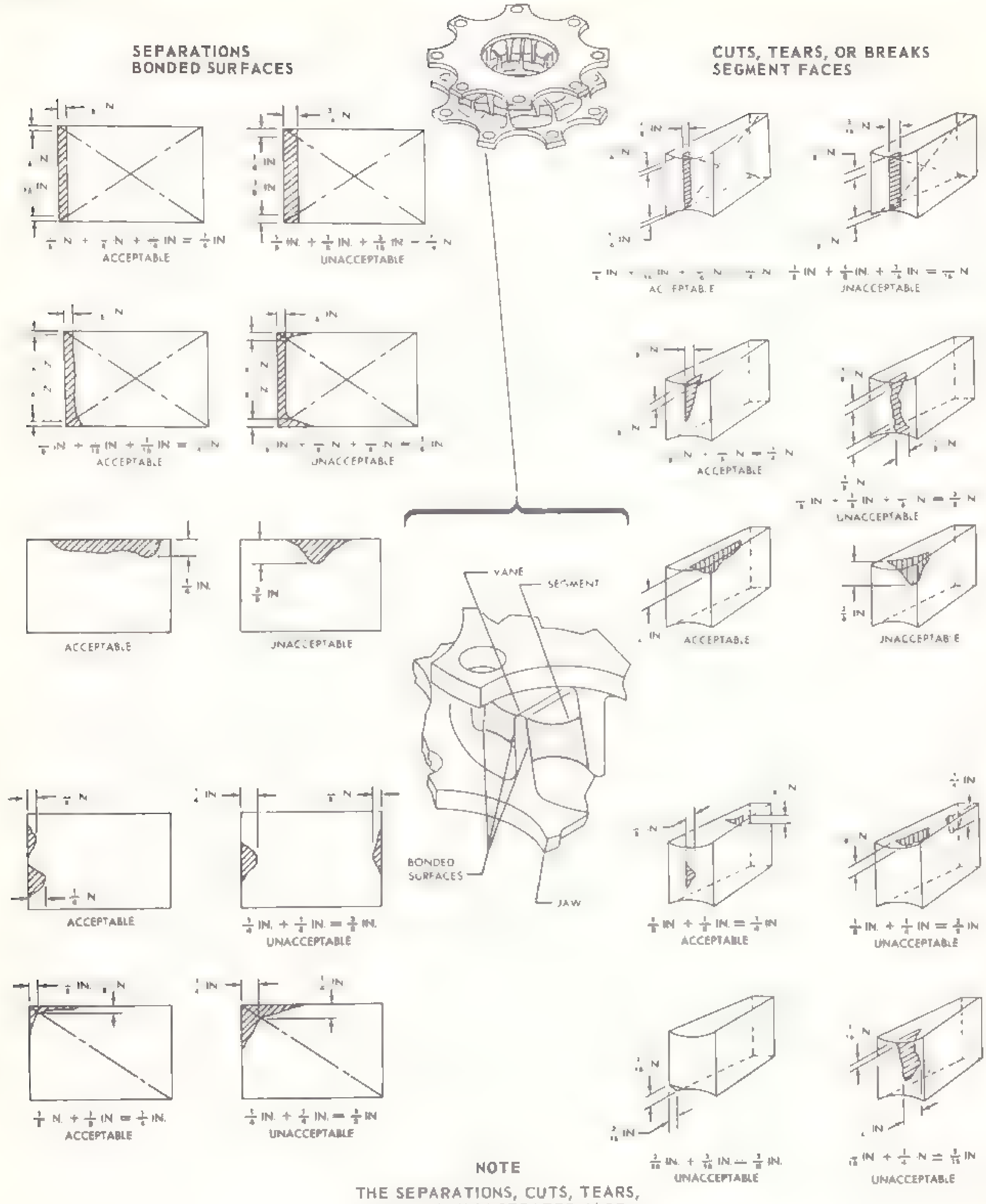
A single cut, tear, or other defect extending over two faces of a segment shall be considered as two defects, and their individual depth shall be measured from the face in which each portion occurs.

(6) Maximum depth of bond separation, cut, tear, or other defect per segment for rubber couplings is 1/4 inch where only one defect of any kind is present in that segment. In cases where more than one defect exists in a segment, the sum of depths of all defects shall not exceed 1/4 inch. Be sure to include depth of each portion of any defect extending over more than one face. Length of any bond separation, cut, or tear in any one face of a rubber segment is not significant.

(7) Replace rubber coupling when any one defect, or combination of defects in one segment, as outlined in steps (4) through (6), exceeds maximum specified. The number of segments with defects is not limited, provided none of the segments are damaged beyond maximum limits.

7–59. *Support Bearings.* The fuselage section of the tail rotor drive shaft is provided with seven (eight on helicopters, serial No. prior to 55-4473) rubber-mounted support bearings (figure 7–17). The second section has one support bearing, the third section has three support bearings, and the fourth section has three support bearings (four are provided on helicopters serial No. prior to 55-4473).

a. Cleaning. Clean exterior surfaces of support bearings with a cloth dampened with solvent (item 4, table 1–8).



NOTE

THE SEPARATIONS, CUTS, TEARS, OR BREAKS ILLUSTRATED ALSO APPLY TO THE S-SHAPED RUBBER SEGMENTS

Figure 7–18. Damage limitations on tail rotor drive shaft rubber couplings

b. Inspection. (1) Inspect brackets and bearings for damage.

(2) Inspect bearings for roughness or loose play.

c. Lubrication. (1) Remove one snap ring retaining bearing to provide accessibility to bearing.

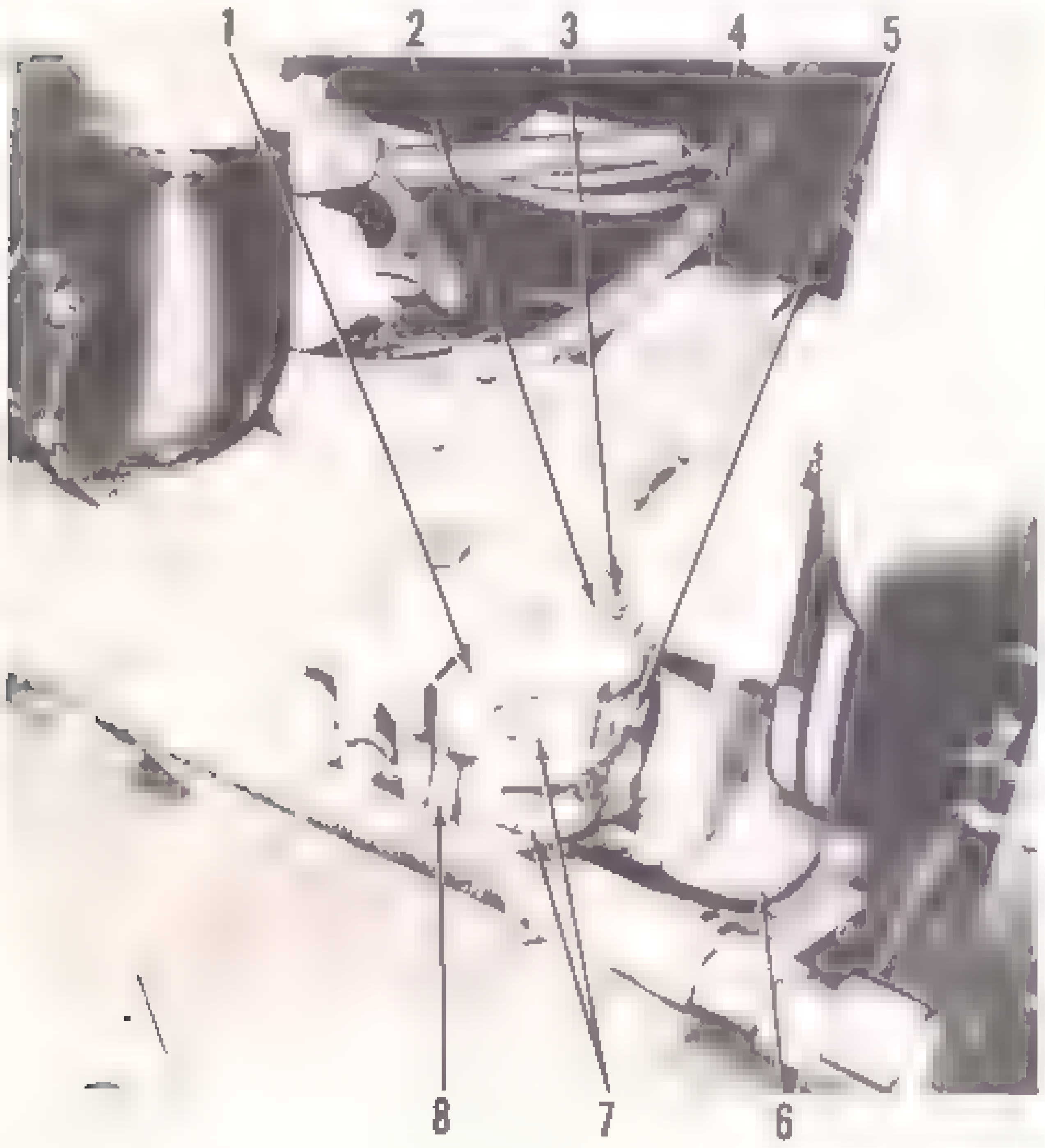
(2) Lubricate bearing with grease (item 53, table 1–8).

(3) Replace snap ring.

7–60. Rotor Brake. The rotor brake consists of a disc that is mounted on the second section of the tail rotor drive shaft and four hydraulic rotor brake halves (figure 7–19) that are mounted in pairs on the transmission deck at each side of the disc. Braking action is accomplished by the opposed pistons in each pair of brake halves, forcing the brake lining against the disc when the pistons are actuated by hydraulic pressure from the master brake cylinder. As the brake lining wears, the pin recedes into an adjusting nut on each brake half enough to restore the normal gap.

a. Troubleshooting. Refer to paragraph 6–46.

b. Removal. (1) Hinge down service platform on left side of helicopter.



1. Rotor Brake Half
2. Bleeder Valve
3. Bleeder Screw
4. Rotor Brake Disc
5. Adjusting Nut
6. Hydraulic Tubing
7. Mounting Bolt
8. Supporting Post

Figure 7–19. Rotor brake halves

(2) Remove tubing joining each set of brake halves. Disconnect tubing outboard of tees in line from accumulators to left brake.

Note

Drain any hydraulic fluid into a suitable receptacle.

(3) Unbolt brake halves from supporting brackets and remove brake halves and shims.

(4) Unscrew tee fittings and elbows from brake housings.

c. Cleaning. Clean brake halves with a cloth dampened with solvent (item 4, table 1–8). Wipe off brake lining with a clean, dry cloth.

d. Inspection. (1) Inspect brake linings for wear.

(2) Check fittings for damaged or burred threads.

(3) Inspect housing for cracks.

(4) Inspect hydraulic pistons for damage and evidence of leakage.

e. Installation. (1) Position a pair of brake halves at supporting bracket on each side of rotor brake disc. Install bolts, washers, and nuts. Tighten nuts to a torque of 50 foot-pounds.

Note

Install shims between the brake halves and the support, as necessary, to equalize the space between the disc and each of the four brake halves and to insure that the brake halves are in plane and parallel to the disc.

Note

Install each bolt with the head forward.

(2) Screw tee fittings and elbows into brake housings.

(3) Connect tubing between fittings on halves and tighten nuts. Connect tubing from accumulators at tee below left brake.

(4) Fill and bleed rotor brake system. (Refer to paragraph 6–47 or 6–48.)

(5) Check adjustment of rotor brake assembly. (Refer to paragraph *f* below.)

(6) Close service platform on left side of helicopter.

f. Adjustment. The rotor brake assembly is self-adjusting. The self-adjustment feature is regulated by an internal adjustment set by the manufacturer. To check for the proper gap between the brake linings and the disc, follow the instructions outlined in steps (1) through (3). To check for excessive brake lining wear, follow the instructions outlined in step (4).

(1) Check that brake halves are in plane and parallel to brake disc.

(2) Actuate and release rotor brake several times.

(3) Measure gap between face of each brake lining and brake disc with a feeler gage. The gap must measure 0.040 to 0.055 inch. Replace brake halves if this condition does not exist. (Refer to paragraphs *b* and *e* above.)

Note

When checking the gap of the forward brake halves, note that the linings have a tendency to ride aft toward the brake disc. This is a normal condition brought about by the angle at which the forward brake halves are mounted and the design of that section of the brake half. It is permissible to use a screw driver to move the linings into their proper position in relationship to the brake disc.

The rotor brake must be properly filled and bled and the accumulator correctly charged as specified in table 6–1 before checking the gap. (Refer to paragraphs 6–47 or 6–48, and 6–50.)

Warning

Do not charge the accumulator with more than maximum pressures specified in table 6–1.

(4) Check brake halves for possible excessive lining wear by observing position of adjusting pin at each brake half. The brake half or lining must be replaced when pin recedes into adjusting pin nut enough to become flush with surface of nut.

Note

No adjustment of adjusting pin nut should be attempted.

7–61. Tail Rotor Drive Shaft — Pylon Section.

The pylon section of the tail rotor drive shaft consists of a disconnect coupling, a disconnect shaft, and a drive shaft. The drive shaft consists of a shaft with an attachment flange and a rubber coupling at either end and a support bearing in the middle. The shaft is installed inside the pylon with the lower coupling attached to the intermediate gear box and the upper rubber coupling attached to the tail rotor gear box. The support bearing is fastened to a bracket at the center of the pylon. Access to the drive shaft components is gained at three places: through the intermediate gear box access panel on the lower right side of the pylon, through the support bearing access panel near the center on the left side of the pylon, and through the disconnect coupling access panel at the upper left side of the pylon.

7–62. Disconnect Coupling. The disconnect coupling, located at top of pylon forward bulkhead, consists primarily of an output coupling mounted on a splined shaft within a housing assembly. The disconnect coupling is necessary to allow folding of the pylon assembly. When the pylon is in flight position, the gear of the disconnect coupling meshes with the gear of the input coupling of the tail rotor drive shaft located at the tail cone rear bulkhead, forming the connection between the tail rotor dirve shaft and the disconnect shaft located in the pylon. Folding the pylon releases the spring-loaded coupling and engages a brake plate bolted to the housing assembly which prevents windmilling of the tail rotor blades. The tension of the compression spring within the disconnect coupling insures a positive meshing between gears when the pylon is in flight position.

a. Cleaning. Clean exterior of disconnect coupling with a cloth dampened with solvent (item 4, table 1–8). Wipe dry with a clean cloth.

b. Lubrication. (1) Lubricate teeth and jaws of output and input coupling with a light coat of graphite grease (item 29, table 1–8).

(2) Lubricate disconnect coupling bearings with grease (item 29, table 1–8).

(3) Lubricate disconnect coupling spline, using adapter, part No. S1670-10629, FSN 4930-672-2011, with grease (item 29, table 1–8).

7–63. Disconnect Shaft. The disconnect shaft (figure 7–17) connects the disconnect coupling assembly with the intermediate gear box assembly in the pylon transmission system. The disconnect shaft assembly is composed of a shaft, two flanges, and two rubber couplings.

a. Cleaning. Clean disconnect shaft with solvent (item 4, table 1–8). Wipe dry with a clean cloth.

b. Inspection. (1) Inspect disconnect shaft for scratches, scores, nicks, gouges, and dents.

(2) Check shaft for looseness and security.

7–64. Drive Shaft. Refer to paragraph 7–57.

7–65. Drive Shaft Rubber Couplings. Refer to paragraph 7–58.

7–66. Support Bearing. Refer to paragraph 7–59*a*, *b*, and *c* for cleaning, inspection, and lubrication of the support bearing.

Section VI Intermediate Gear Box

7–67. Description. The intermediate gear box (figure 7–20), located inside the pylon, transmits torque with no gear reduction and changes the angle of drive of the shaft between the main rotor gear box and the tail rotor gear box. The intermediate gear box consists of an input housing assembly, a center housing assembly, and an output housing assembly. An oil level sight gage is located on the right side of the center housing and a magnetic plug is located at the bottom of the housing. An oil filler tube assembly extends from the top of the input housing assembly upward through the skin of the pylon. Access to the gear box is gained by removing the intermediate gear box panel on the right-hand side of the pylon.

7–68. *Troubleshooting.* For troubleshooting procedures for the intermediate gear box, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
High frequency vibration in helicopter structure caused by intermediate gear box	Intermediate gear box mounting nuts loose	Notify direct support maintenance unit.
	Faulty bearings in intermediate gear box	Notify direct support maintenance unit.
	Gear teeth damaged	Notify direct support maintenance unit.
Intermediate gear box mounting nuts loose	Aluminum washers being used under mounting nuts	Notify direct support maintenance unit.
Intermediate gear box running too hot (paint scorched or blistered)	Insufficient lubrication	Service intermediate gear box with proper lever and grade of oil. (Refer to paragraph 1–60.)
	Faulty bearings in intermediate gear box	Notify direct support maintenance unit.
	Improper gear tooth clearances (backlash)	Notify direct support maintenance unit.
Excessive oil leakage at seals	Deterioration of seals	Notify direct support maintenance unit.
Discoloration of heat paint stripe	Overheated bearings in area of discoloration	Notify direct support maintenance unit.

7–69. *Cleaning.* Clean external surfaces of intermediate gear box with solvent (item 4, table 1–8). Wipe dry with a clean cloth.

7–70. *Inspection.* Inspect intermediate gear box for oil leakage and metal particle contamination as follows:

a. Leakage of the intermediate gear box caused by a faulty seal, gasket, packing, or shim must not exceed the component maximum listed in table 7–5. Total leakage from all sources listed in table 7–5 must not

Table 7–5. Intermediate gear box oil leakage

COMPONENT	MAXIMUM LEAKAGE PER COMPONENT
Seal	2 cubic centimeters per hour
Gasket	1 cubic centimeter per hour
Packing	1 cubic centimeter per hour
Shim	1 cubic centimeter per hour

Figure 7–20. Intermediate gear box

exceed 3 cubic centimeters per hour. During a flight of 10 hours duration, total leakage, including loss from breather or vent openings, must not exceed the amount which causes the oil level of the gear box to drop one-third of the distance from the FULL to the REFILL lines on the oil sight level gage.

b. Inspect intermediate gear box for metal particle contamination as follows:

(1) Open access door in intermediate gear box access panel.

(2) Cut lock wire and unscrew magnetic plug from bottom plate of center housing.

Note

The magnetic plug may now be inspected without the necessity of draining the intermediate gear box. (Refer to paragraphs 7–4 and 7–5.)

(3) Screw drain attachment into fitting and drain oil into a receptacle.

(4) Unscrew drain attachment and install and secure the magnetic plug with lock wire. Close access door.

(5) Fill intermediate gear box with oil. (Refer to paragraph 1–60.)

Section VII Tail Rotor Gear Box

7–71. Description. The tail rotor gear box (figure 7–21), which is located on top of the pylon, performs three functions: It controls the pitch of the tail rotor; it changes the angle of drive from the intermediate gear box; and it reduces the rpm of the tail rotor drive shaft to the tail rotor assembly rpm. An arm assembly on the aft side of the tail rotor gear box, connected to the tail rotor control linkage, actuates a lever and rod assembly within the tail rotor gear box. An actuator shaft assembly, attached to the rod assembly, operates a pitch beam bolted to the shaft assembly. A protective boot is installed on the pitch beam shaft. The pitch beams connect to the sleeve of each tail rotor blade to change the pitch of the blades. An oil level sight gage indicates oil level when the pylon is unfolded. A dipstick is provided for measuring the oil level when the pylon is folded. The gear box is splash-lubricated and has an oil filler located on the top of the

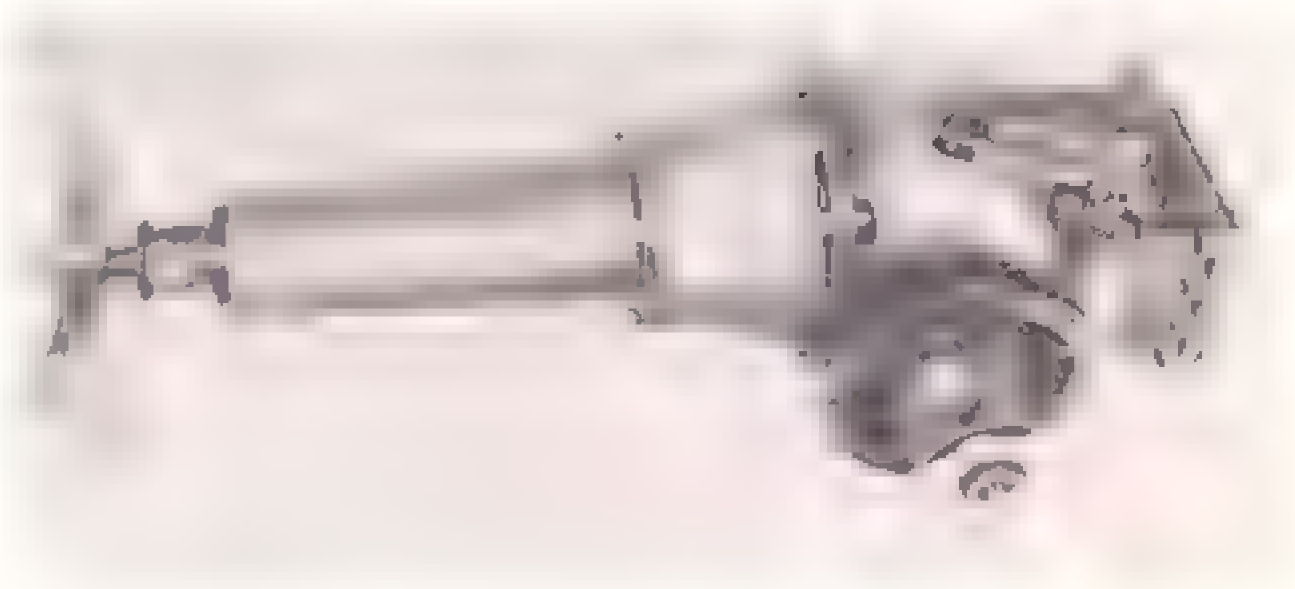


Figure 7–21. Tail rotor gear box

intermediate housing assembly and a magnetic plug installed in the bottom of the input housing assembly. Access to the tail rotor gear box is gained by removing the screen and fairing at the top of the pylon.

7–72. Troubleshooting. For troubleshooting procedures for the tail rotor gear box, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
High frequency vibration in helicopter structure caused by tail rotor gear box	Tail rotor gear box mounting nuts loose	Notify direct support maintenance unit.
	Faulty bearings in tail rotor gear box	Notify direct support maintenance unit.
	Gear teeth damaged	Notify direct support maintenance unit.
Tail rotor gear box mounting nuts loose	Aluminum washers being used under mounting nuts	Notify direct support maintenance unit.
	Interference between mounting flange and pylon bracket	Notify direct support maintenance unit.
Signs of cracks on mounting flange		Notify direct support maintenance unit.
Tail rotor gear box running too hot (paint scorched or blistered)	Insufficient lubrication	Service tail rotor gear box with proper level and grade of oil. (Refer to paragraph 1–60.)
	Faulty bearings in tail rotor gear box	Notify direct support maintenance unit.
	Improper gear tooth clearance (backlash)	Notify direct support maintenance unit.
Excessive oil leakage at seals	Deterioration of seals	Notify direct support maintenance unit.
Discoloration of heat paint stripe	Overheated bearings in area of discoloration	Notify direct support maintenance unit.

7–73. *Cleaning.* Clean external surfaces of tail rotor gear box with solvent (items 4, table 1–8). Wipe dry with a clean cloth.

7–74. *Inspection.* Inspect tail rotor gear box for oil leakage, metal particle contamination, pitch beam side play, and actuator shaft side play as follows:

a. Leakage of the tail rotor gear box caused by a faulty seal, gasket, packing, or shim must not exceed the component maximum listed in table 7–6. Total leakage from all sources listed in table 7–6 must not exceed 3 cubic centimeters per hour. During a flight of 10 hours duration, total leakage, including loss from breather or vent openings, must not exceed the amount which causes the oil level of the gear box to drop one-third of the distance from the FULL to the REFILL lines on the oil sight level gage.

b. Inspect tail rotor gear box for metal particle contamination as follows:

(1) Remove access panel on upper left side of pylon.

(2) Cut lock wire and unscrew magnetic plug from tail rotor gear box.

Note

The magnetic plug may now be inspected without the necessity of draining the gear box. (Refer to paragraphs 7–4 and 7–5.)

(3) Screw drain attachment into fitting and drain oil into a receptacle.

Table 7–6. Tail rotor gear box oil leakage

COMPONENT	MAXIMUM LEAKAGE PER COMPONENT
Seal	2 cubic centimeters per hour
Gasket	1 cubic centimeter per hour
Packing	1 cubic centimeter per hour
Shim	1 cubic centimeter per hour

(4) Unscrew drain attachment and install and secure magnetic plug with lock wire, and install access panel.

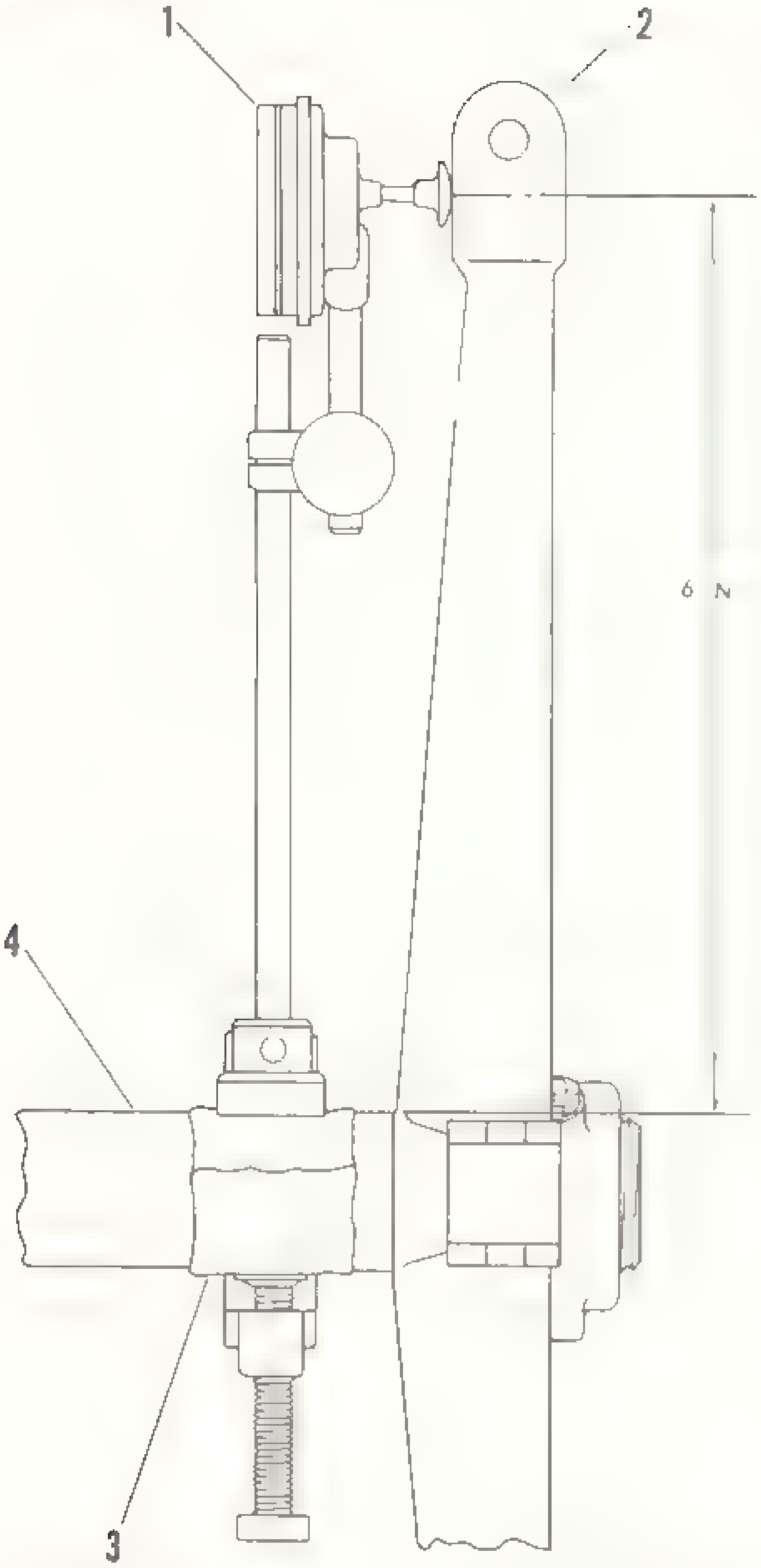
(5) Fill tail rotor gear box with oil. (Refer to paragraph 1–60.)

c. The pitch beam may be inspected for side play without removing the tail rotor gear box or the pitch beam. Proceed as follows.

(1) Clamp dial indicator (1, figure 7–22) to actuator shaft (4) and extend it to a point of forked end of pitch beam (2) 6 inches from surface of actuator shaft. Loosen and slide boot on actuator shaft to provide space for clamping dial test indicator.

Note

Abrasive cloth (3) (item 23, table 1–8) wrapped around the shaft with abrasive side out will insure a tight grip on the actuator shaft.



1. Dial Indicator
2. Pitch Beam
3. Abrasive Cloth
4. Actuator Shaft

Figure 7—22. Measuring side play of pitch beam

(2) Grasp hub and attempt to rock pitch beam on actuator shaft. If side play reading is 0.020 inch or more, pitch beam must be replaced. (Notify direct support maintenance unit.)

Caution

Use care to avoid bending arms of the pitch beam and thereby obtaining a false reading.

d. The following inspection for checking side play between actuator shaft and control shaft bearing may be accomplished without removing the tail rotor gear box assembly or the pitch beam.

(1) Work outboard end of boot off shoulder of collet or hub of pitch beam to expose actuator shaft.

(2) Position and attach a dial indicator to shaft as close as possible to control shaft bearing.

(3) Grasp actuator shaft and move it from side to side. Maximum allowable side play should exceed 0.010 inch.

Note

Notify direct support maintenance unit if side play exceeds 0.010 inch.

CHAPTER 8

MAIN AND TAIL ROTOR GROUPS

Section I Scope

8–1. Purpose. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete main and tail rotor groups.

8–2. Description. The main and tail rotor groups consist of the main rotor head assembly, main rotor blades, and two types of tail rotor assemblies (with and without counterweights). The main rotor head assembly is mounted above the transmission compartment of the helicopter on the main shaft of the main transmission. Four rotor blades provide the lift necessary to maintain flight and are attached to the sleeves of the main rotor assembly. The main rotor is inclinded at a 3-degree angle forward of the perpendicular. The tail rotor assembly (without counterweights), located on the top left of the pylon, consists of the tail rotor assembly and the pitch control mechanism and is supported and driven by the horizontal shaft of the tail rotor gear box. The tail rotor assembly produces anti-forces which may be varied by the pilot to control the flight heading of the helicopter. Changing the pitch of the blades is accomplished through the pitch change beam attached to the actuator shaft which moves through the horizontal shaft of the tail rotor gear box. The pitch change beam is connected by pitch change links to the single-forked arms of the spindle sleeves. Four flapping hinges to which the spindles are connected permit coning (flapping) of the blades to 10 degrees in each direction. The major difference between the tail rotor assembly with counterweights and the type without is a counterweight assembly installed on the horizontal shaft of the tail rotor gear box between the gear box and the tail rotor assembly. The pitch change beam is connected to the double-forked arms of the spindle sleeves by pitch change links; the counterweight assembly is linked to the same forked arms by counterweight links. The counterweight assembly reduces the load on the tail rotor pedals, thereby making the pedals easier to manipulate.

8–3. Special Tools. Special tools required for performance of organizational maintenance are listed in TM 55-1520-202-20P, Organizational Maintenance Repair Parts and Special Tools Lists.

Section II Main Rotor Hub and Blade

8–4. Description. Principal components comprising the main rotor hub and blade are the main rotor head assembly and four rotor blades. These components, working with the engine, transmission, and flight controls, produce vertical and horizontal motion necessary for flight.

8–5. Main Rotor Head Assembly. The main rotor head assembly (figure 8–1) is splined to and is supported by the main drive shaft of the main transmission. The main rotor head assembly supports the main rotor blades, is rotated by torque from the main transmission, and provides the means of transmitting the movements of the flight controls to the blades. The principal components of the main rotor head assembly are the main rotor hub assembly and the star assembly. The main rotor hub assembly consists primarily of an upper and lower plate secured to a hub and spacers, hinge assemblies which are located between each arm of the plates and to which sleeve-spindle assemblies are attached, and four main rotor dampers. The star assembly consists of a rotating star and a stationary star. Other components of the main rotor head assembly are the fluid tank assembly, main rotor damper, four droop restrainers, four antiflapping restrainers, the stationary and the rotating scissors, and four control rods. The star assembly and the four control rods permit the movements of the flight controls to be transmitted to the main rotor blades. The hinge assemblies allow each blade to hunt, or move horizontally, about its vertical axis. The dampers, which are supplied with hydraulic oil from the damper fluid tank, restrict this horizontal motion. The sleeve-spindle assemblies allow each blade to flap, or move vertically, about its

horizontal axis. The antiflapping restrainers and the droop restrainers restrict this vertical motion when the rotor head is not rotating. The stationary scissors are secured to the stationary star and the main transmission. The rotating scissors are secured to the rotating star and the main rotor hub assembly. An upper boot assembly is installed at the top of the rotating star beneath the main rotor head, and a lower boot assembly is installed between the bottom of the stationary star and the top of the main transmission. Boot assemblies protect the star assembly from the effects of sand, dirt, moisture, and ice.

8–6. *Troubleshooting.* For troubleshooting procedures for the main rotor head assembly, proceed as follows:

Note

Malfunctioning of main rotor head assembly results in abnormal low frequency vibrations.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low frequency vibration noticed through control stick	Faulty servo unit	Notify direct support maintenance unit.
Low frequency vibration noticed through fuselage	Rotor blades out of track	Track and adjust blades. (Refer to paragraph 8–29.)
	Main rotor blade damaged	Replace blade. (Refer to paragraphs 8–23 and 8–28.)
	Loss of hydraulic fluid in damper fluid in damper fluid tank	Service fluid tank. (See figure 2–1.) Replace leaking tank and line if excessive loss continues. (Refer to paragraphs 8–11*a* and *g*.)
	Dirty hydraulic fluid in dampers	Drain and refill dampers and fluid tank. (Refer to paragraph 8–12*e*.)
	Air in damper	Work air out of damper. (Refer to paragraph 8–12*f*, step (7).)
	False damper rate	Correct for excessive play or binding at attachment points. (Refer to paragraph 8–12*d* and 8–13*d*.)
	Uneven damper rate	Replace dampers. (Refer to paragraphs 8–12*a* and *f*.)
	Improper relief valve action in damper	Replace damper. (Refer to paragraphs 8–12*a* and *f*.)
	Defective sleeve bearings	Notify direct support maintenance unit.
	Defective hinge bearings	Notify direct support maintenance unit.
	Hub assembly improperly installed	Notify direct support maintenance unit.
	Loose lock nut on main transmission shaft	Notify direct support maintenance unit.
	Main transmission improperly installed	Notify direct support mainte-unit.
	Failure of fuselage at main transmission attachment point	Notify direct support mainte-unit.
	Failure of main transmission supports	Notify direct support maintenance unit.
	Excessive side play in main transmission shaft	Notify direct support maintenance unit.
	Mismatching of split cones	Notify direct support maintenance unit.
	Foreign material on the cone seat, or improper cone seating	Notify direct support maintenance unit.

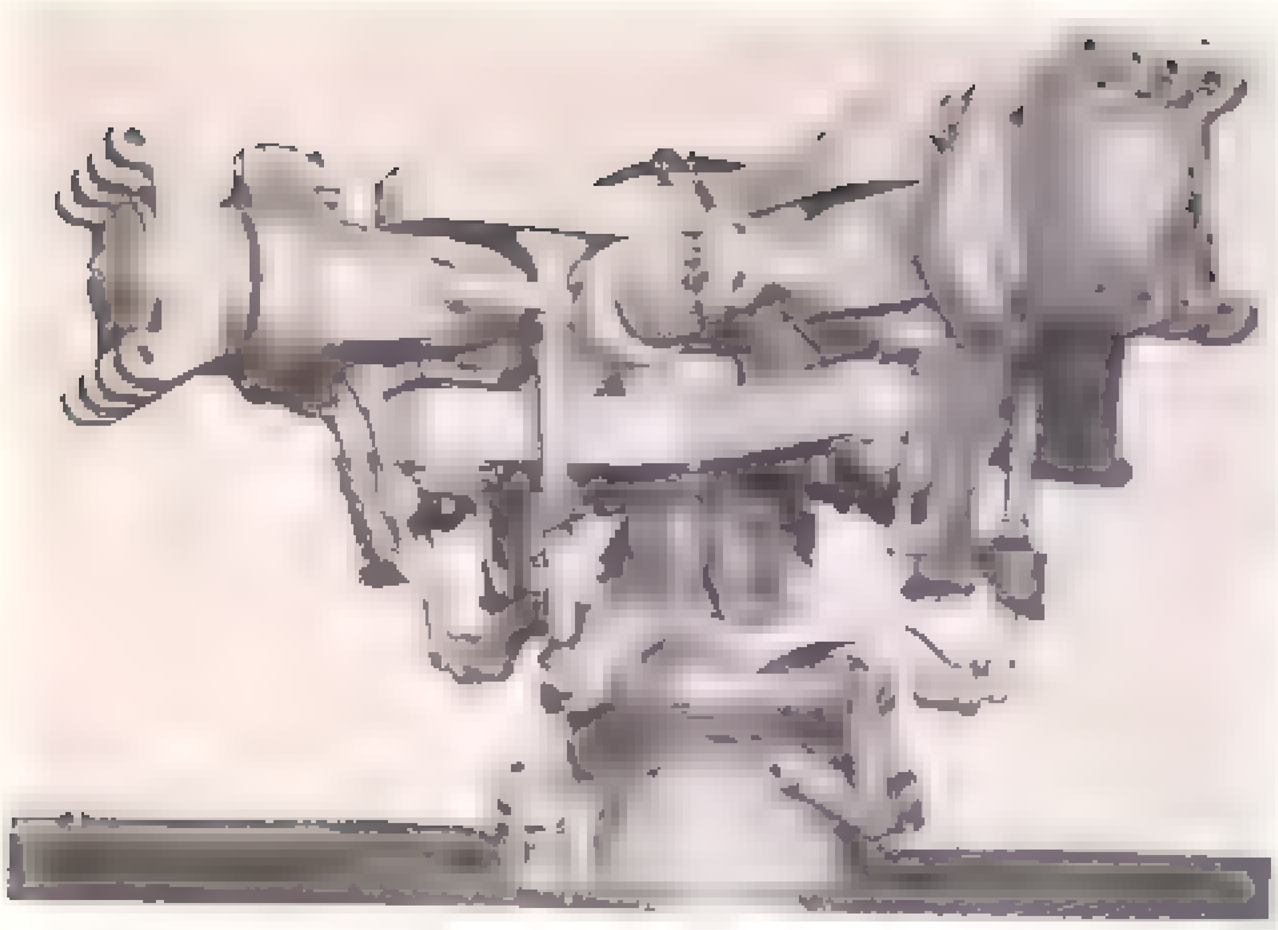


Figure 8–1. Main rotor head assembly installed

8–7. Operational Check. a. Start engine and engage main rotor head assembly in accordance with TM 55-1520-202-10.

Warning

Operation of the main rotor head assembly must be performed by a qualified pilot.

b. Check main rotor head assembly for proper response and unusual noise or vibration.

c. Secure engine in accordance with TM 55-1520-202-10.

8–8. Cleaning. a. Clean main rotor head assembly with a clean cloth slightly moistened in solvent (item 4, table 1–8).

b. Wipe main rotor head dry with clean, lint-free cloth.

Caution

Do not allow solvent to come in contact with main rotor blades, as solvent will dissolve adhesive on blades.

8–9. Inspection. a. Check operation of each damper trunnion assembly as follows:

(1) Wrap pin with abrasive cloth (item 23, table 1–8) (grit side out) as shown in figure 8–2.

(2) Install dial indicator on pin and damper fork assembly as shown in figure 8–2.

(3) Holding applicable main rotor blade in maximum lead position, set dial indicator.

(4) Move applicable main rotor blade to maximum trailing position and read end play indication on dial page.

Note

The maximum in-service tolerance end play of the damper trunnion assembly is 0.015 inch. Should the in-service tolerance exceed 0.015 inch, trunnion assembly components should be inspected as indicated in paragraph 8–13*c*. Also inspect bushings, part No. S1610-26034 and -1, as indicated in paragraph 8–12*c*.

b. Inspect hub bore as follows:

(1) Remove fluid tank assembly in accordance with instructions given in paragraph 8–11*a*.

(2) Inspect general area of hub bore for corrosion, with particular emphasis on bolt ring section adjacent to hub.

Caution

If corrosion is found in this area, rotor head must be removed and forwarded to an overhaul depot for rework by qualified personnel.

(3) Replace fluid tank assembly in accordance with instructions given in paragraph 8–11*g*.

8–10. Special Precautions to Prevent Corrosion. a. Force sealing compound (item 34, table 1–8) into area between upper plate and hub. (See figure 8–3.)

b. Clean and coat bolt ring section of upper plate adjacent to hub bore area with corrosion preventive compound, grade 1 (item 24, table 1–8). (See figure 8–3.)

c. Force sealing compound (item 34, table 1–8) into keyways of liners to prevent moisture from entering. (See figure 8–3.)

8–11. Fluid Tank Assembly. The fluid tank assembly serves as a reservoir for damper hydraulic oil and is installed over the hub in the center of the main rotor head assembly. Hydraulic oil is supplied to each damper from the fluid tank assembly through hose assemblies. The required oil level for the fluid tank assembly is marked on the transparent plastic tank top. The fluid tank assemblies installed on helicopters serial No. 54-2912 and subsequent differ in design from tank assemblies installed on helicopters serial No. prior to 54-2912. When a fluid tank assembly on helicopters serial No. prior to 54-2912 become inoperative and spare parts are exhausted, the tank assemblies shall be replaced with the newer tank assemblies.

a. Removal. (1) With a suitable container under hose connections at main rotor damper, disconnect each hose assembly from each damper elbow (A-STEP 1, figure 8–4) and allow hydraulic fluid to drain into container.

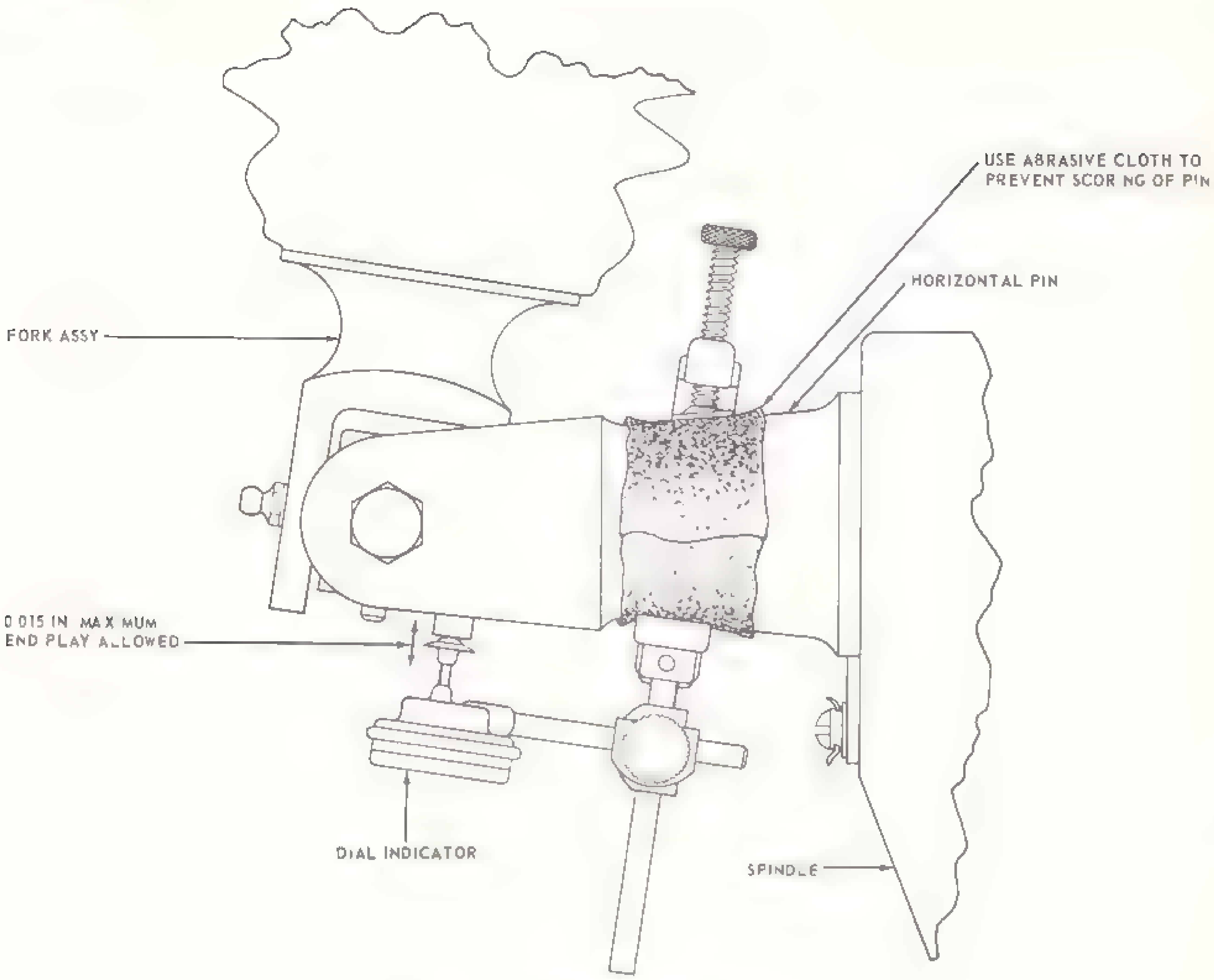


Figure 8–2. Measuring end play in damper trunnion

(2) Remove bolts and washers attaching fluid tank assembly to main rotor head assembly; then remove tank with hose assemblies installed (B-STEP 1, figure 8–4).

(3) Remove hose assemblies from fluid tank assembly.

Caution

Insure foreign matter does not enter hose assemblies or main rotor dampers while disconnected.

b. Disassembly. (1) Disassemble fluid tank assemblies for helicopters prior to serial No. 54-2912 as follows:

(a) Remove nipples and preformed packings from reservoir assembly.

(b) Remove oil cup from stud.

(c) Remove assembled stud and strainer, spring, and washer from fluid tank; then remove restrainer from stud.

(d) Separate fluid tank from reservoir assembly and remove preformed packing from fluid tank.

(e) Remove preformed packing and gasket from reservoir assembly.

(2) Disassemble fluid tank assemblies for helicopters serial No. 54-2912 and subsequent as follows:

(a) Remove nipples and preformed packing from fittings installed on fluid tank assembly.

(b) Remove strainer assembly and preformed packing from fluid tank assembly.

Caution

Do not attempt to remove the fitting or separate the fluid tank from the reservoir assembly, since they are bonded together.

c. Cleaning. Clean all parts except preformed packings and gaskets with solvent (item 4, table 1–8).

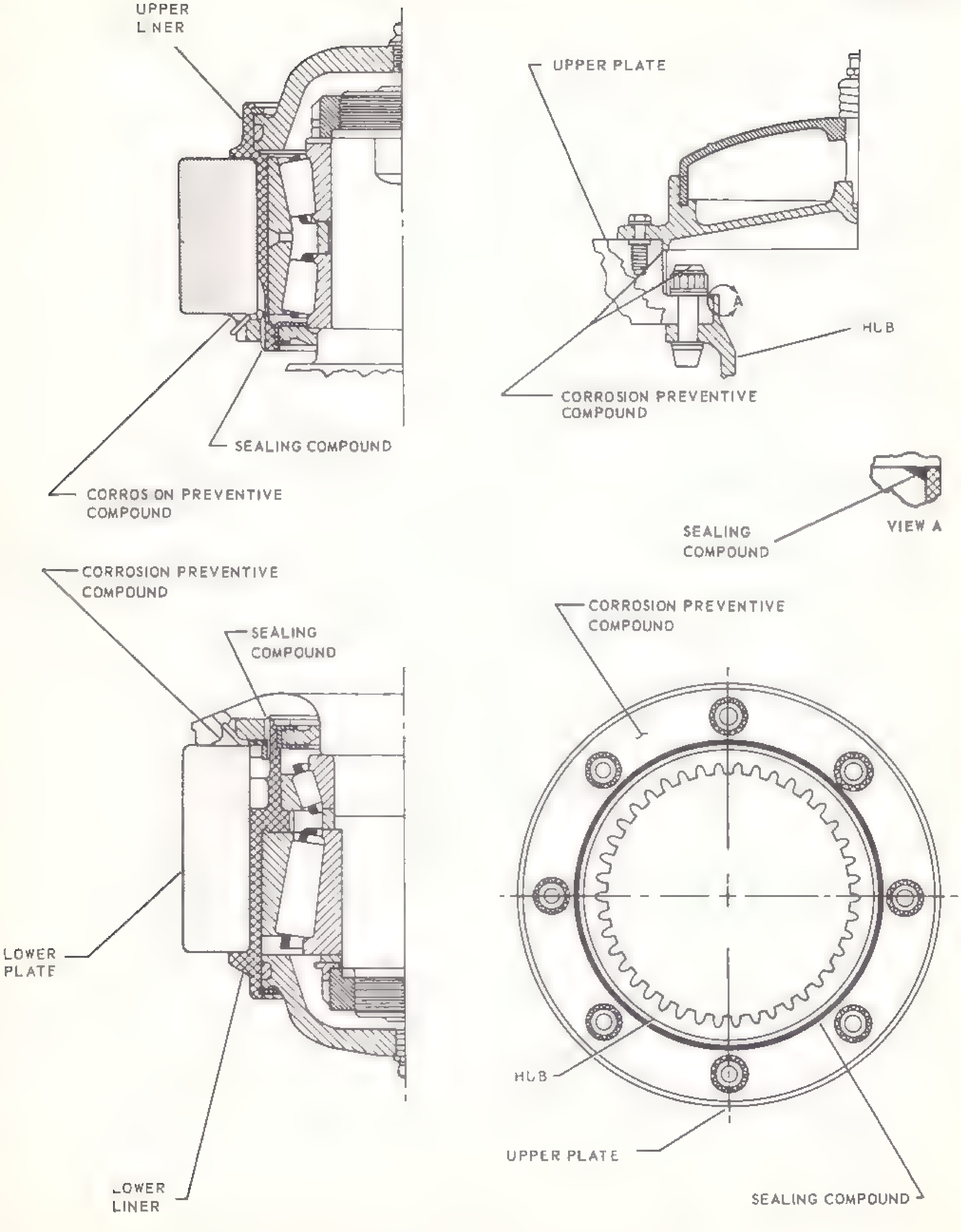


Figure 8-3. Corrosion-preventive measures — main rotor head assembly

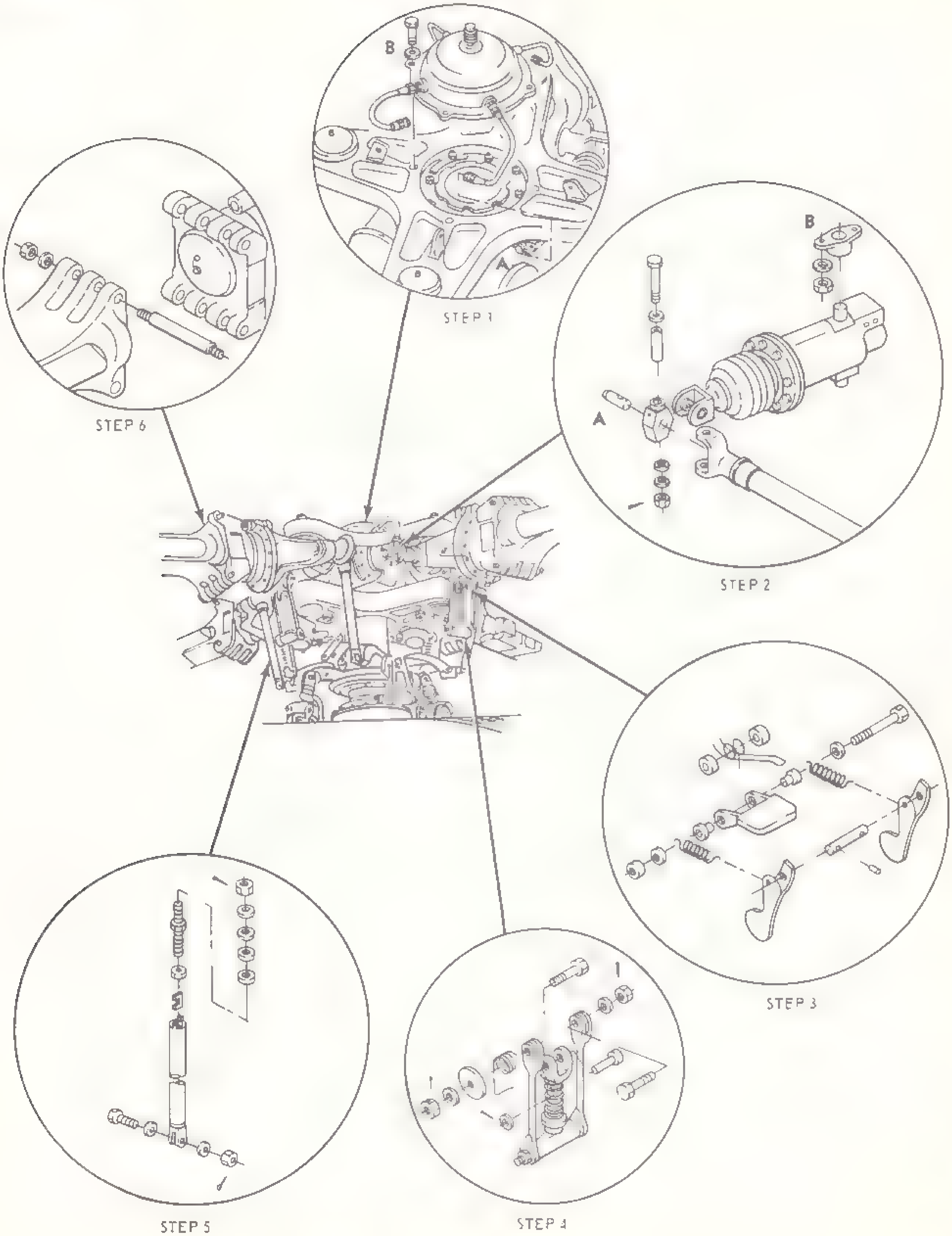


Figure 8–4. Main rotor head components removal

d. Inspection. (1) Inspect plastic parts for warped, chipped, cracked, or broken condition.

(2) Inspect all metal parts for bent, cracked, or broken condition.

e. Repair or replacement. (1) Replace all preformed packing and gaskets.

(2) Replace all damaged parts with serviceable parts.

Note

When repair parts are exhausted for older design fluid tank assemblies, replace older assemblies with the latest fluid tank assembly.

f. Reassembly. (1) Reassemble fluid tank assemblies for helicopters serial No. prior to 54-2912 as follows:

(a) Reassemble gasket and preformed packing on reservoir assembly.

(b) Reassemble preformed packing on fluid tank and position fluid tank on reservoir assembly.

(c) Reassemble strainer in stud; then reassemble washer, spring, and assembled stud and strainer on top of fluid tank.

(d) Reassemble oil cup in top of stud.

(e) Reassemble preformed packings and nipples on reservoir assembly.

(2) Reassemble fluid tank assemblies for helicopters serial No. 54-2912 and subsequent as follows:

(a) Reassemble strainer assembly and preformed packing on top of fluid tank assembly.

(b) Reassemble preformed packings and nipples on fittings installed on fluid tank assembly.

Note

No other reassembly is required since other parts of the fluid tank assembly are bonded together and should not have been disassembled.

g. Installation. (1) Install hose assemblies on tank nipples.

(2) Place fluid tank assembly and hose assemblies in proper position on main rotor head assembly (B-STEP 1, figure 8–4) and attach with bolts and washers.

(3) Connect hose assemblies to corresponding damper elbows (A-STEP 1, figure 8–4).

(4) Fill fluid tank assembly with hydraulic fluid (item 3, table 1–8) to FULL mark.

8–12. Main Rotor Damper. A main rotor damper (figure 8–5) is installed between the upper and lower plates of the main rotor hub assembly inboard of each hinge assembly. The piston of the damper is connected by a trunnion assembly to each hinge assembly. Hydraulic fluid for the damper is supplied from the fluid tank assembly. Self-bleeding of the damper is accomplished by an internal differential valve. The dampers restrain the hunting of the blades during rotation and also absorb shocks between the blades and the main rotor hub assembly during clutch engagement, or when the main rotor rpm or blade pitch is changed.

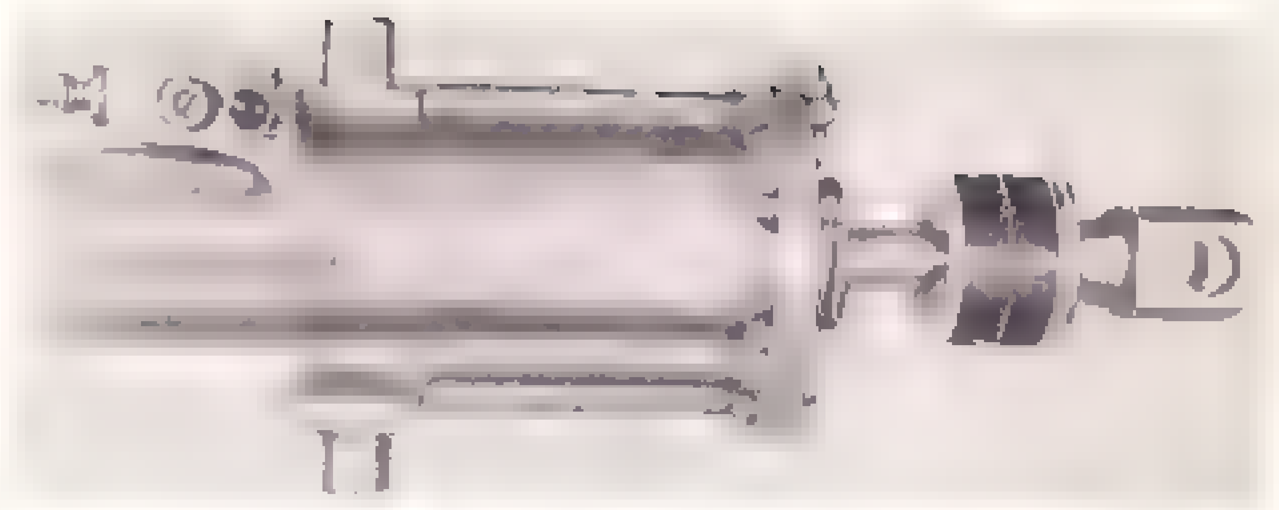


Figure 8–5. Main rotor damper

a. Removal. (1) With a suitable container under hose connection at applicable main rotor damper, disconnect hose assembly from damper elbow (A-STEP 1, figure 8–4) and allow hydraulic fluid to drain into container.

(2) Remove cotter pin, bolt, washers, nut, and sleeve; then extend damper piston. Separate trunnion assembly from damper fork assembly by removing horizontal pin (A-STEP 2, figure 8–4).

(3) Unbolt upper and lower brackets from upper and lower plates of hub assembly and remove damper (B-STEP 2, figure 8–4). Remove bracket assemblies.

Note

If interference is encountered between damper and hub-to-upper plate bolt, proceed as indicated in steps (4) and (5).

(4) Remove fluid tank assembly. (Refer to paragraph 8–11*a*.)

(5) If interfering bolt is not bolt in offset position (stamped O on upper plate) or one of the bolts which secure locknut lock, remove bolt to provide necessary clearance and remove damper.

(6) If bolt is either offset bolt (stamped O on the upper plate) or one of the bolts which secure locknut lock, remove damper to right of one being removed to provide clearance. Remove damper.

Caution

Insure foreign matter does not enter hose assembly or main rotor damper while disconnected.

b. Cleaning. Wipe exterior surfaces of main rotor damper clean with a clean cloth moistened in solvent (item 4, table 1–8).

c. Inspection. (1) Inspect rubber boot for breaks or evidence of deterioration.

(2) Inspect exterior surfaces of damper housing for cracks, deep gouges, or breaks.

(3) Inspect bearing surfaces for deep scratches, scoring, grooves, cracks, and indication of uneven wear.

(4) Check ID of bushings, part No. S1610-26034 and -1.

Note

The bushing may wear to 0.8135-inch ID.

(5) Check for loose bushings.

(6) Inspect lock wire for broken or loose condition.

d. Repair or replacement. (1) Replace main rotor damper if damper boot has breaks or evidence of deterioration.

(2) Replace main rotor damper if damper housing has cracks, deep gouges, or breaks.

(3) Replace main rotor damper if bearing surfaces have deep scratches, scoring, grooves, cracks, or evidence of uneven wear.

(4) Replace main rotor damper if bushings are worn beyond wear limits.

(5) Replace main rotor dampers if bushings or lock wire is broken or loose.

(6) Replace main rotor damper if it leaks or does not function properly.

e. Lubrication. (1) Fill main rotor damper with pressure equipment as follows:

(a) Remove plug from damper cylinder head.

(b) Remove larger of two plugs at other end of cylinder.

Note

This plug is inner one of two plugs in top of offset pad.

(c) Connect a line from a hydraulic pump to port in cylinder head.

(d) Hold damper at an angle with elbow end up. Pump hydraulic fluid (item 3, table 1—8) into damper until it runs freely without air bubbles from open port and elbow at upper end.

(e) Disconnect line and reverse position of damper, connecting line to elbow on other end.

(f) Pump hydraulic fluid into damper and through elbow until fluid flows without air bubbles out both cylinder head port and other open port.

(g) Install two plugs in damper and secure with lock wire.

(h) Disconnect pressure line and cap off elbow.

Note

For instructions on bleeding dampers, refer to paragraph *f*, step (7) below.

(2) Fill main rotor head without pressure equipment as follows:

(a) Unscrew plug from damper cylinder head.

(b) Remove larger of two plugs at other end of cylinder.

Note

This plug is inner one of two plugs in top of offset pad.

(c) Fill a receptacle with hydraulic fluid (item 3, table 1—8) and submerge damper completely in fluid. Wait until all air bubbles disappear.

(d) Keeping damper submerged, cycle piston in and out by hand until all air is expelled.

Note

After cycling piston, hold damper with elbow end higher than cylinder head end and check for evidence of trapped air at port in offset pad.

(e) Install plugs and cap off elbow while damper is still submerged.

(f) Secure two plugs with lock wire.

Note

For instructions on bleeding the dampers, refer to paragraph *f*, step (7) below.

f. Installation. Install main rotor dampers as follows: (See figure 8—4.)

Warning

Dampers, part No. S1610-26000-3 and -4, are interchangeable with other S1610-26000-3 and -4 dampers only. These dampers must never be interchanged with S1610-26000-1 and -2 dampers due to the difference in the interval timing. The S1610-26000-1 and -2 dampers are interchangeable with other S1610-26000-1 and -2 dampers only.

(1) Set bracket assemblies on damper, set damper in position between upper and lower plates (B-STEP 2, figure 8—4) and install bolt, two washers, and nut in each end of bracket. Tighten nuts with 270 to 330 inch-pounds torque.

(2) Assemble trunnion assembly in damper fork assembly and attach with horizontal pin (A-STEP 2, figure 8—4). Attach trunnion assembly to pin with bolt, washers, sleeve, and nut. Tighten nut to a torque of 150 to 200 inch-pounds and install cotter pin.

(3) If damper on right was removed to provide clearance, reinstall that damper.

(4) Install hub-to-upper plate bolt and tighten nut with 560 to 690 inch-pounds torque.

(5) Install fluid tank assembly. (Refer to paragraph 8—11*g*.)

(6) Fill fluid tank with hydraulic fluid (item 3, table 1—8).

(7) Cycle each damper four to five times by moving each main rotor blade back and forth horizontally in hunting motion to bleed any trapped air in dampers out through differential check valve.

Note

This operation together with instructions in paragraph 8–12, step *e*(1) and step *e*(2), completes damper bleeding requirements.

g. Preparation for storage and shipment. (1) Drain hydraulic fluid from main rotor damper and fill with preservative hydraulic fluid (item 9, table 1–8). (Refer to paragraph 8–12*e*.)

(2) Place cap on damper elbow.

(3) Coat exposed part of piston rod with corrosion preventive compound (item 27, table 1–8).

(4) Wrap damper in barrier material (item 7, table 1–8) and secure with tape (item 26, table 1–8).

h. Placing in service. (1) Remove protective shipping material main from rotor damper.

Note

Leave preservative hydraulic fluid in main rotor damper until time for installation.

(2) Remove petrolatum from exposed part of piston rod with solvent (item 4, table 1–8).

(3) Drain preservative hydraulic fluid from main rotor damper and fill damper with hydraulic fluid (item 3, table 1–8). (Refer to paragraph 8–12*e*.)

8–13. Trunnion Assembly. The trunnion assembly serves as a flexible link between the main rotor damper and pin that attaches the sleeve-spindle assembly. The leading and trailing motion of the main rotor blade is transmitted through the trunnion assembly to the main rotor damper.

a. Removal. (1) Remove cotter pin, bolt, washers, nut, and sleeve.

(2) Extend damper piston and separate trunnion assembly from damper fork assembly by removing horizontal pin (A-STEP 2, figure 8–4).

b. Cleaning. Clean trunnion assembly and connecting parts with solvent (item 4, table 1–8). Wipe each part dry using a clean, dry cloth.

c. Inspection. (1) Check diameter of reamed holes in fork ends of horizontal pin, part No. S1610-26060 or -1. Pin should be replaced if diameter is worn beyond 0.4395 inch.

(2) Check diameter of horizontal pin, part No. S1610-26059 or -1. Pin should be replaced if diameter is worn below 0.8105 inch.

(3) Check ID of bearing, part No. S1610-26033 or -1. Bearing should be replaced if ID is worn beyond 0.5645 inch.

(4) Check ID and OD of bearing, part No. S1610-26037-1. Bearing should be replaced if ID is worn beyond 0.4390 inch or OD is worn below 0.5601 inch.

d. Repair or replacement. Replace all parts worn beyond limits.

e. Installation. (1) Install trunnion assembly in damper fork assembly and attach with horizontal pin (A-STEP 2, figure 8–4).

(2) Attach trunnion assembly to pin with bolt, washers, bearing, and nut. Tighten nut to a torque of 150 to 200 inch-pounds and install cotter pin.

8–14. Droop Restrainer. A droop restrainer for each blade is installed on the vertical hinge assembly. The droop restrainer, which limits the droop of the blade when the blade is at rest, consists of a flap, two cam arms attached to a shaft, a spring to hold each cam arm in position, and a torsion spring which forces the flap down when the cam arms are extended. When the rotor head is rotating, centrifugal force throws the cam arms out and permits unrestricted vertical movement of the blades. (See step 3, figure 8–4.)

a. Removal. (1) Unhook and remove springs from cam arms and spacers. (STEP 3, figure 8–4).

(2) Remove rollpin from either cam arm and remove cam arm from shaft.

(3) Lift antiflapping restrainer up out of way and work shaft and other cam arm out. Remove remaining rollpin and cam arm from shaft.

(4) Remove bolt, washer, spacers, spring, assembled flap and bushings, washer, and nut.

b. Cleaning. Clean all parts in solvent (item 4, table 1–8). Wipe each part dry using a clean, dry cloth.

c. Inspection. (1) Inspect all springs for broken or distorted condition.

(2) Inspect bearing surface of bushings for deep scratches, scoring, grooves, cracks, and indication of uneven wear.

(3) Inspect remaining parts for bent, cracked, or broken condition.

d. Repair or replacement. (1) Replace parts that have bearing surfaces which are scratched, scored, grooved, cracked, or worn unevenly.

(2) Replace all parts that are bent, cracked, or broken.

e. Installation. (1) Install bolt, washer, assembled flap and bushing, spacers, spring, washer, and nut (STEP 3, figure 8–4).

(2) Install one cam arm on shaft and attach with rollpin. Lift antiflapping restrainer up out of way and install shaft.

(3) Install other cam arm on shaft and attach with rollpin.

(4) Install springs on cam arms and spacers.

8–15. Antiflapping Restrainer. An antiflapping restrainer is installed on each of the four hinge assemblies of the main rotor head assembly. The antiflapping restrainers are spring-loaded locks which prevent the main rotor blades from flapping on their horizontal hinges when the main rotor is not rotating. When the main rotor is rotating, centrifugal force holds the antiflapping restrainers outward from the locked position, thus permitting free flapping and coning of the main rotor blades. (See STEP 4, figure 8–4.)

a. Removal. (1) Release tension on horizontal spring and remove cotter pin, bolt, washer, collar, horizontal spring, and nut (STEP 4, figure 8–4) from one side of antiflapping restrainer assembly.

(2) Remove cotter pin, bolt, washer, and nut from other side.

(3) Remove cotter pin, washer, pin, and antiflapping restrainer assembly from main rotor head assembly.

b. Cleaning. Clean all parts in solvent (item 4, table 1–8). Wipe each part by using a clean, dry cloth.

c. Inspection. (1) Inspect all springs for broken or distorted condition.

(2) Inspect remaining parts for bent, cracked, or broken condition.

d. Repair or replacement. (1) Replace springs that are broken or distorted.

(2) Replace all parts that are bent, cracked, or broken.

e. Installation. (1) Place antiflapping restrainer in mounting position on main rotor head assembly and attach with pin, washer, and cotter pin (STEP 4, figure 8–4).

(2) Place horizontal spring, collar, and applicable restrainer arm in mounting position and attach with bolt, washer, nut, and cotter pin.

(3) Place remaining restrainer arm in mounting position and attach with bolt, washer, nut, and cotter pin.

(4) Position horizontal spring to apply proper tension.

8–16. Control Rod Assembly. A control rod assembly extends from each eyebolt on the rotating star to the yoke on each horn assembly. All control movements of the star assembly are transmitted by the control rods to the main rotor blades through the horn assemblies of the sleeve-spindle assemblies. The horizontal plane or track of each blade can be adjusted by increasing or decreasing the length of the control rod. (See STEP 5, figure 8–4.)

a. Removal. (1) Disconnect control rod assembly (STEP 5, figure 8–4) from eyebolt on rotating star by removing cotter pin, bolt, washers, and nut.

(2) Disconnect control rod assembly from spider on horn assembly by removing boot, cotter pin, check nut, washer, nut, and thrust washers.

b. Disassembly. (1) Remove lock wire and screw nut back until lock is free from tube assembly and rod end can be turned; then remove tube assembly from rod end.

(2) Remove lock from rod end by removing nut.

c. Cleaning. Clean all parts in solvent (item 4, table 1–8). Wipe each part dry using a clean, dry, cloth.

d. Inspection. (1) Inspect all threaded parts for damaged threads.

(2) Inspect parts for bent, cracked, or broken condition.

e. Repair or replacement. Replace all parts that are bent, cracked, broken, or that have damaged threads.

f. Reassembly. (1) Reassemble nut and lock on rod end.

(2) Screw rod end into tube. Screw nut down until lock sets into slot of tube.

(3) Safety nut to rod end with lock wire.

g. Installation. (1) Place a thrust washer on rod end (STEP 5, figure 8–4) and insert rod end through spider of horn assembly.

Note

If the rod end has a radius on the shoulder in lieu of a groove, a countersunk thrust washer, part No. S1610-21016, must be used to eliminate circumferential scoring of the rod end. Place the countersunk side of the thrust washer away from the spider. Use plain washers, part No. S1610-21021, between the thrust washer and the nuts, as necessary.

(2) Place another thrust washer on rod end and attach with thicker nut. Tighten nut until there is no end play.

(3) Install washer and check nut on rod end and tighten against thicker nut.

Note

The rod end should rotate by hand with no end play.

(4) Install cotter pin in check nut.

(5) Install boot over connection.

(6) Connect control rod assembly to eyebolt on rotating star bearing assembly by installing bolt, washer, and nut. Tighten nut to a torque of 90 to 125 inch-pounds and install cotter pin.

(7) Check flight control rigging. (Notify direct support maintenance unit.)

(8) Track main rotor blades. (Refer to paragraph 8—29.)

8—17. Stationary Scissors. The stationary scissors consists of two links, upper and lower. These links are attached to each other by a common bolt which acts as a pivot point for the scissors actions. The lower link is secured to lugs on the seal retainer of the main transmission. The upper link is secured to a bearing assembly on the stationary star. The stationary scissors prevents the stationary star from rotating, simultaneously permitting tilting action of the stationary star.

a. Cleaning. Clean stationary scissors with a clean cloth moistened with solvent (item 4, table 1—8). Wipe stationary scissors dry using a clean, dry cloth.

b. Inspection. Inspect stationary scissors for warped or broken condition and for corrosion, cracks, gouges, and looseness.

8—18. Rotating Scissors. The rotating scissors consists of two links, upper and lower. The links are attached to each other by a common bolt which acts as a pivot point for the scissors action. The lower link is secured to a bracket on the rotating star. The upper link is secured to a bracket on the main rotor hub assembly. The rotating scissors causes the rotating star to rotate with the main rotor assembly, simultaneously permitting the tilting action of the rotating star.

a. Cleaning. Clean rotating scissors with a clean cloth moistened with solvent (item 4, table 1—8). Wipe rotating scissors dry using a clean, dry cloth.

b. Inspection. Inspect rotating scissors for warped or broken condition and for corrosion, cracks, gouges, and looseness.

8—19. Star Assembly. The star assembly (figure 8—6) transmits the movement of the main rotor flight controls to the main rotor blades through the main rotor hub assembly. The star assembly consists of a rotating star connected to the main rotor hub assembly by the rotating scissors and a stationary star which is prevented from rotating by the stationary scissors which are connected to the main transmission. A ball ring socket assembly allows the star assembly to be tilted as a unit on its horizontal plane as well as raised and lowered on its vertical axis. When the three primary servo units which are connected to the stationary star are actuated by the main rotor flight control system, the movement of the stationary star is transmitted to the rotating star. From the rotating star the control movement is transmitted by control rods to the horns of the sleeve-spindle assemblies to change the angle of incidence of the blades.

a. Cleaning. Clean star assembly with a clean cloth moistened with solvent (item 4, table 1—8). Wipe star assembly dry using a clean, dry, cloth.

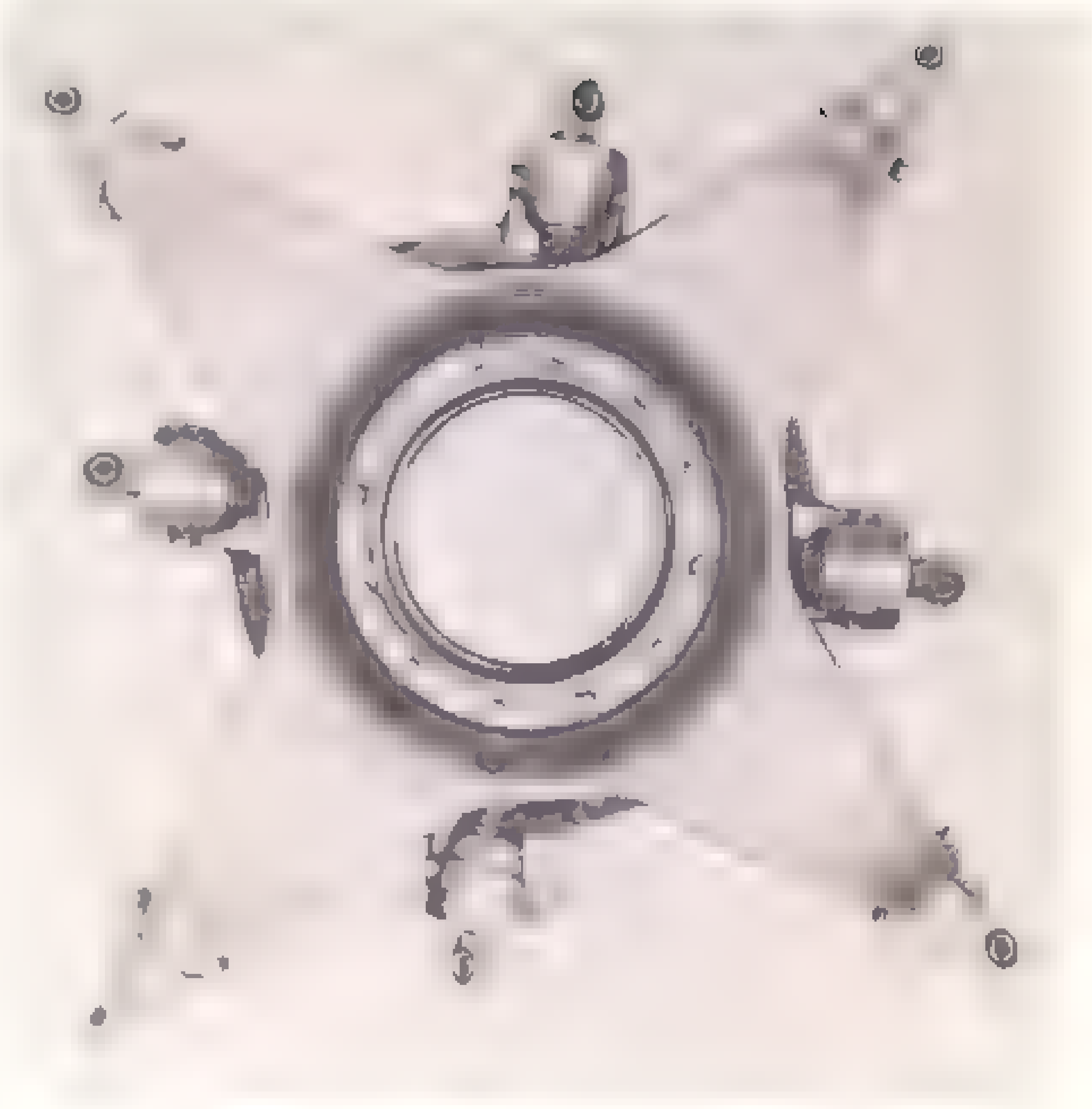


Figure 8—6. Main rotor star assembly

b. Inspection. Inspect star assembly for corrosion, cracks, and gouges.

8—20. Main Rotor Blades. The four main rotor blades are secured to the sleeves of the main rotor head assembly by taper pins and nuts. Each blade consists of a hollow, extruded aluminum spar; 23 aluminum trailing edge pockets bonded to the spar; a tip cap fastened with screws to the spar and the outboard pocket; and a cuff bolted to the inboard end of the spar to provide the means of attachment to the main rotor head assembly. The aluminum spar forms the leading edge of the blade. Each blade is balanced statically and dynamically within close tolerance, thus permitting the blade to be interchanged or replaced individually within its own group. On helicopters serial No. 54-3050 and subsequent, the blade cuffs and the main rotor sleeve assemblies are heavier than those on helicopters serial No. prior to 54-3050. The blades with heavier cuffs can be used only on main rotor head assemblies having heavier sleeve assemblies. Plates are installed on the heavier blade cuffs and main rotor sleeve assemblies to prevent installation of these blades on the wrong main rotor head assembly. (Refer to note following paragraph 8—26, step *e*.)

8—21. Troubleshooting. Troubleshoot main rotor blades in accordance with procedures given in paragraph 8—6.

8—22. Operational Check. Check operation of main rotor blades in accordance with instructions given in paragraph 8—7.

8—23. Removal. Remove each main rotor blade as follows:

a. Support main rotor blade at both ends, using rack, part No. S1670-10013, FSN 1730-099-3244.

b. Remove nut and washer (STEP 6, figure 8–4) from each taper pin.

c. Loosen each taper pin by threading puller, part No. S1570-10338-11, FSN 5120-626-5122, onto threads at large end and tighten puller until pin is pulled free. Remove loose pin and unscrew puller.

d. Remove blade from main rotor head sleeve-spindle assembly and lower blade.

e. Using a suitable method of transportation, transport blade to blade storage rack.

f. Store main rotor blade in a suitable padded rack with leading edge down.

8–24. *Cleaning.* Wash main rotor blades with mild soap (item 14, table 1–8) and water only.

Warning

Never use solvents or cleaners, such as lacquer thinner, naphtha, carbon tetrachloride, or other organic compounds to clean rotor blades. These compounds will weaken the bonding of the blades.

8–25. *Inspection.* *a.* Inspect tip cap, pockets, and root cap for sharp or deep dents, corrosion, cracks, and holes.

b. Lightly slide hand along flat surfaces of pockets and check for buckling. Also, visually sight down both sides of pockets for buckling.

c. Visually inspect both sides of pockets at spar for bond separation.

Caution

Do not check bonded areas of pockets for bond separation by tapping with a coin or other object.

d. Inspect spar for corrosion, cracks, deep dents, and sharp scratches or nicks.

e. Inspect outer surfaces of cuff for corrosion, cracks, and sharp scratches or nicks.

f. Inspect taper pin holes for rust, corrosion, and scratches.

8–26. *Repair or replacement.* *a.* Repair of the main rotor blade is limited to replacement of the tip cap. Replace tip cap as follows:

(1) Remove screw attaching tip cap and remove tip cap from blade.

Warning

The weights bolted to the blade spar under the tip cap must not be altered or disturbed in any way. When lead wool is cemented inside of tip cap, it should not be disturbed.

(2) Inspect inner surface of tip cap for corrosion.

(3) Replace tip cap if corroded or damaged beyond repair.

Warning

When a new tip cap is required, it must be exactly the same size, shape, and weight of the tip cap that was removed from the main rotor blade.

(4) When tip cap with lead wool is replaced by new tip cap, bond lead wool in corresponding position on new tip cap as follows:

Warning

The lead wool must raise the weight of the new tip cap to the exact weight of the tip cap being replaced.

(a) Clean lead wool area inside new tip cap with a clean cloth moistened with thinner (item 57, table 1–8). Wipe area dry with a clean dry cloth.

(b) Brush two coats of adhesive (item 41, table 1–8) to cleaned area of tip cap. Allow first coat to dry at least 30 minutes before applying second coat. Allow second coat of adhesive to dry approximately 10 minutes until adhesive becomes tacky.

(c) Press lead wool firmly to adhesive and allow to dry at room temperature for 24 hours.

(5) Clean tip cap, spar, and pocket rib mating surfaces with a clean cloth moistened with thinner (item 57, table 1–8).

Warning

Do not allow any lacquer thinner to seep into the joints where the pocket is bonded to the spar. Thinner is a solvent and will weaken the bond.

(6) Coat mating surfaces of tip cap, spar, and pocket rib with sealing compound (item 45, table 1–8).

(7) Install tip cap on blade. Attach tip cap to blade with AN507-832R8 screws in first five top and bottom holes from spar leading edge, and AN507-832-6 screws in remaining four top and bottom aft holes.

(8) Paint new tip cap in accordance with paragraph 8–27.

b. Replace main rotor blade if root cap or pockets have sharp or deep dents, corrosion, cracks, or holes.

c. Replace main rotor blade if pockets are buckled or if there is evidence of bond separation.

d. Replace main rotor blade if spar has corrosion, cracks, deep dents, and sharp scratches or nicks.

e. Replace main rotor blade if cuff taper pin holes have rust, corrosion, or scratches, or if outer surface has corrosion, cracks, or sharp scratches or nicks.

Note

Any main rotor blade having a plate on its cuff may be installed on any main rotor head assembly which has mating plates on its sleeve assemblies. Any main rotor blade not having a plate on its cuff may be installed on any main rotor head assembly which does not have plates on its sleeve assemblies. The two design groups are not interchangeable. The part No. S1615-20000 main rotor blade assembly can only be installed on the part No. S1610-20000, -1, -2, -3, -9, -10, -13, or -14 main rotor head assembly. The part No. S1615-20100-1 main rotor blade assembly can only be installed on the part No. S1610-20000-8 or -16 main rotor head assembly.

8–27. *Painting.* If main rotor blade tip cap requires painting, proceed as follows:

a. Clean bare metal with metal conditioner and rust remover, type III, (item 58, table 1–8). Allow it to remain for a few minutes, then reapply conditioner. While it is wet, wipe tip cap completely dry. Use only a clean, white cloth for wiping to avoid any contamination of metal surfaces which will prevent proper adhesion of paint.

Warning

Do not allow any metal conditioner to seep into the joints where pocket is bonded to the spar or into gaps between pockets of the main rotor blade.

b. Mask off spar and pockets of main rotor blade.

c. Spray tip cap with a light coat of primer coating (item 19, table 1–8) and allow to dry.

d. Spray tip cap with one even coat of lacquer (color No. 614) (item 75, table 1–8) and allow to dry.

e. Remove masking material from main rotor blade.

Caution

Main rotor blades are painted and balanced after fabrication. Any attempt to paint the complete blade will change the blade balance and set up undesirable flight characteristics.

8–28. *Installation.* Install each main rotor blade as follows:

Caution

Before installing a main rotor blade, check to see that blade is proper type for main rotor head assembly on which it is to be installed. (Refer to note following paragraph 8–26, step *e.*)

a. Support main rotor blade at both ends, using crutch assembly, part No. S1670-10013, FSN 1730-099-3244. Place blade cuff in mounting position on main rotor head sleeve-spindle assembly.

Note

The leading edge of the blade must face the direction of rotation.

b. Coat taper pins lightly with grease (item 59, table 1–8) and insert pins into position (STEP 6, figure 8–4) with a soft-headed mallet.

Caution

Do not hammer pins after they are once seated.

c. Secure each taper pin with washer and nut. Tighten each nut to a torque of 60 to 65 inch-pounds.

Caution

Tighten nuts to a torque of 60 to 65 inch-pounds regardless of torque values stenciled on the blades.

d. Track main rotor blades in accordance with paragraph 8–29.

8–29. *Adjustment.* Main rotor blades adjustment is determined by a tracking procedure. Track and adjust main rotor blades as follows:

Note

Tracking the main rotor blades consists of checking the blades under actual operating conditions to make sure that all blades rotate in the same horizontal plane or track. Adjustment of the pitch of the blade is made, as necessary, to compensate for inherent blade angle differences. Tracking must be performed when the helicopter has been rerigged, or main rotor blades, main transmission, or main rotor head assembly has been replaced. Unless the main rotor blades are in proper track, vibration will occur in the helicopter with every revolution of the main rotor blades.

a. Mark tip of each blade with chalk or wax crayon of same color as color code on cuff of blade itself.

b. Face helicopter into wind.

c. Set pole of trackometer, part No. S1670-10396, FSN 5220-300-3053, on ground on right side of helicopter and about 12 inches outside rotating disc area of main rotor blades. (See figure 8–7.)

d. Mark position of trackometer pole on ground and adjust height of trackometer so that middle of flag will be level with rotating blade tips.

e. Start engine, place SERVO switch in ON position, and engage clutch. (Refer to TM 55-1520-202-10.)

Warning

The helicopter shall be operated by a qualified pilot.

f. Operate engine at 2200 rpm and increase collective pitch to medium pitch. Hold both control sticks steady.

Figure 8—7. Tracking main rotor blades

Warning

The helicopter should be in firm contact with the ground while tracking blades. If necessary to track blades with greater power, or if helicopter is very light, the helicopter should be weighted down.

Note

Tracking should never be attemped with SERVO switch in any other position than in ON position.

g. Personnel using trackometer should stand facing in same direction as helicopter so that advancing blades come from behind and are viewed after they pass overhead.

h. Keep pole in marked position on ground with flag pointed slightly in direction of rotation.

i. Slowly move trackometer into tip path of blades and allow each blade to make one contact with trackometer flag. Tilt trackometer away from blades as quickly as possible when contact with blades has been made.

Note

There is no feel received from rotor blades striking trackometer. If there is any hesitation on tipping trackometer out after contact has been made, more than one set of marks will be made on trackometer.

j. Examine blade markings on flag. If spread of marks is greater than 1/2 inch, adjust pitch of blade or blades that are out of track in accordance with instructions in step *k* below.

Note

Check tracking a second or third time before making adjustment. A sudden gust of wind or slight movement of controls will cause a false indication of blade track.

k. Adjust pitch of main rotor blade as follows:

Note

A main rotor blade is adjusted by increasing or reducing the length of the control rod assembly which extends from the rotating star to the horn yoke on the sleeve-spindle assembly.

(1) Slide boot down control rod assembly.

(2) Remove lock wire from jam nut below yoke.

(3) Loosen jam nut.

(4) Increase or reduce length of control rod assembly by turning hex area of rod end just below yoke. (See figure 8—8.)

Caution

Do not adjust rod length by use of lock nut, since this can cause misalignment of the bearing in arms of trunnion yoke assembly.

Note

Shorten control rod assembly to lower tip path plane; lengthen control rod assembly to raise tip path plane.

(5) Tighten jam nut and secure with lock wire.

(6) Slide boot up control rod assembly and place in proper position.

l. Clean trackometer flag.

m. Track blades again to determine if adjustments are satisfactory. (Refer to steps *a* through *j* above.)

Note

Although a spread of 1/2 inch for track mark of blades is allowable, it is recommended that blades be adjusted until they are in perfect track.

n. Readjust main rotor blades if necessary. (Refer to step *k* above.)

o. Check to see that jam nut is tight and secured with lock wire.

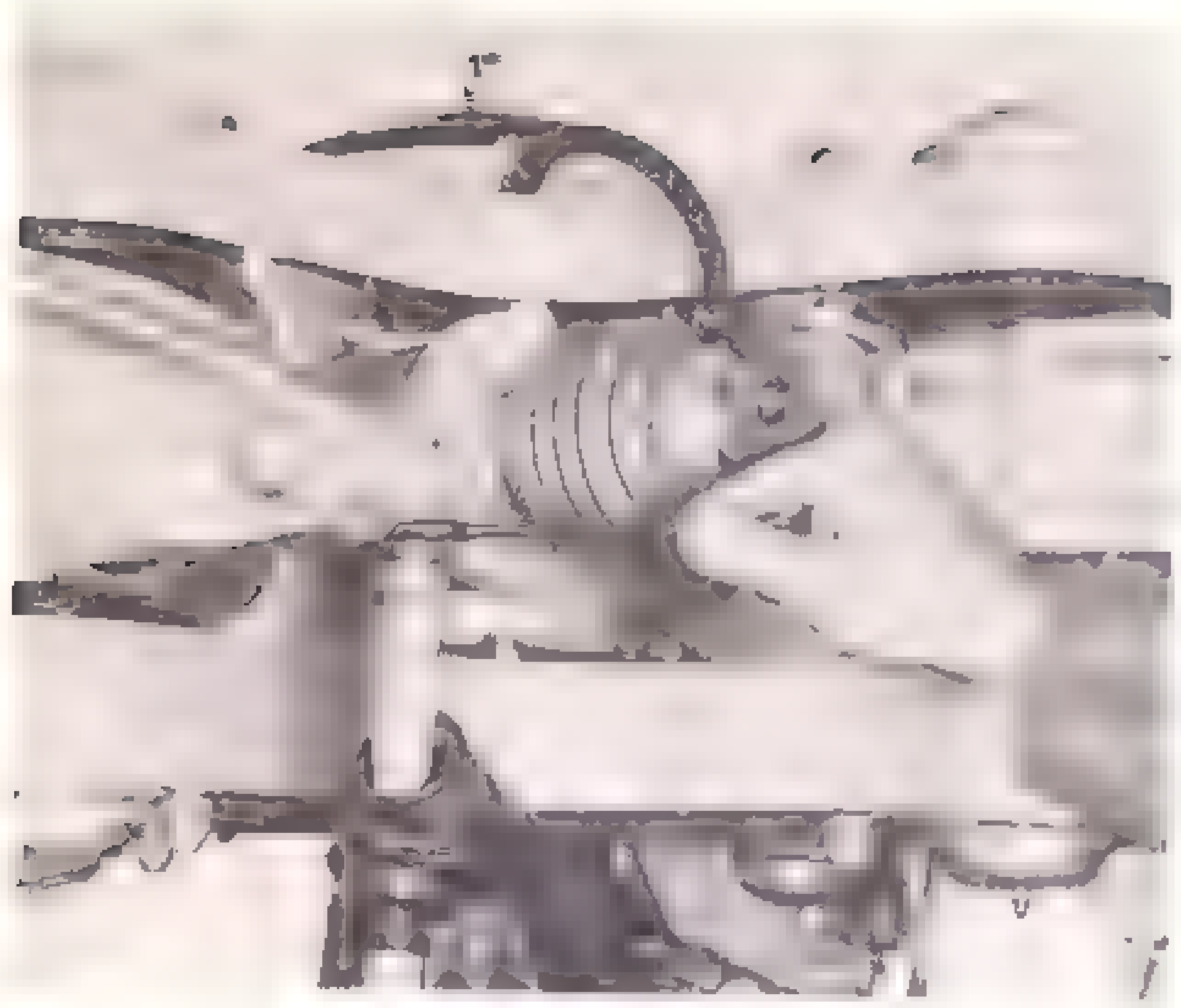


Figure 8—8. Adjusting main rotor blade pitch

Note

If helicopter is rough after tracking blades at medium pitch and power, recheck tracking at high power with takeoff rpm and main rotor pitch increased until helicopter is almost hovering, but still in firm contact with ground. Adjust as necessary.

8—30. *Preparation for Storage or Shipment. a.* Coat blades with corrosion preventive compound (item 24, table 1—8).

b. Pack main rotor blades securely in a suitable shipping container with leading edge down. Refer to table 8—1 for approved storage or shipping containers.

Table 8—1. Main rotor blade storage and shipping containers

PART NO.	MANUFACTURER
E-1-6599-100	Ludwig Harold Mfg Co. Foleroft, Pa.
E-11261-1-300	Ludwig Harold Mfg Co. Foleroft, Pa.
E-6632-1-1	Ludwig Harold Mfg Co. Foleroft, Pa.
E-6632-100-1	Ludwig Harold Mfg Co. Foleroft, Pa.
MD-840	Modern Dunnage Mfg Co. Philadelphia,
MD-874	Modern Dunnage Mfg Co. Philadelphia, Pa.
MD-835	Modern Dunnage Mfg Co. Philadelphia, Pa.
56026-1	Container Research Associates Inc. Swarthmore, Pa.
56075-1	Container Research Associates Inc. Swarthmore, Pa.
56075-5	Container Research Associates Inc. Swarthmore, Pa.
58B-001-1	Container Research Associates, Inc. Swarthmore, Pa.
550	Pry Welding and Mfg Co. Modena, Pa.

8—31. *Placing In Service. a.* Remove blades from shipping containers.

b. Clean blades. (Refer to paragraph 8—24.)

Section III Tail Rotor Hub and Blade

8—32. Description. Principal components comprising this group are the tail rotor hub assembly, four tail rotor blades, and on some helicopters, a counterweight assembly.

8—33. Tail Rotor Hub (With and Without Counterweights). The helicopter heading and antitorque control are provided by the tail rotor assembly. The tail rotor assembly without counterweights consists of four rotor blades attached to the sleeve of the four spindle assemblies which connect to a single control hub assembly. The ears of the sleeve attach, with shims, to the cuff end of the blade. The spindle, which attaches to the hub, also runs through a set of ringed stock bearings within the sleeve. A lubrication fitting is located on the surface of the sleeve. A single-forked arm on the sleeve serves as an attaching point for one rod end of the pitch change link. See figure 8—9 for a view of a tail rotor assembly without counterweights. The tail rotor assembly with counterweights is similar to the tail rotor assembly without counterweights with the exception of a double-forked arm on the sleeve which serves as an attaching point for one rod end of both the pitch change link and the counterweight link assemblies. The counterweight assembly is installed on the tail rotor gear box output shaft between the gear box and the tail rotor assembly. The counterweight assembly is connected by four counterweight link assemblies to the forked arms of the spindle assembly. The counterweight assembly reduces the load on the tail rotor controls, thereby making the pedals easier to manipulate. The action of the counter-

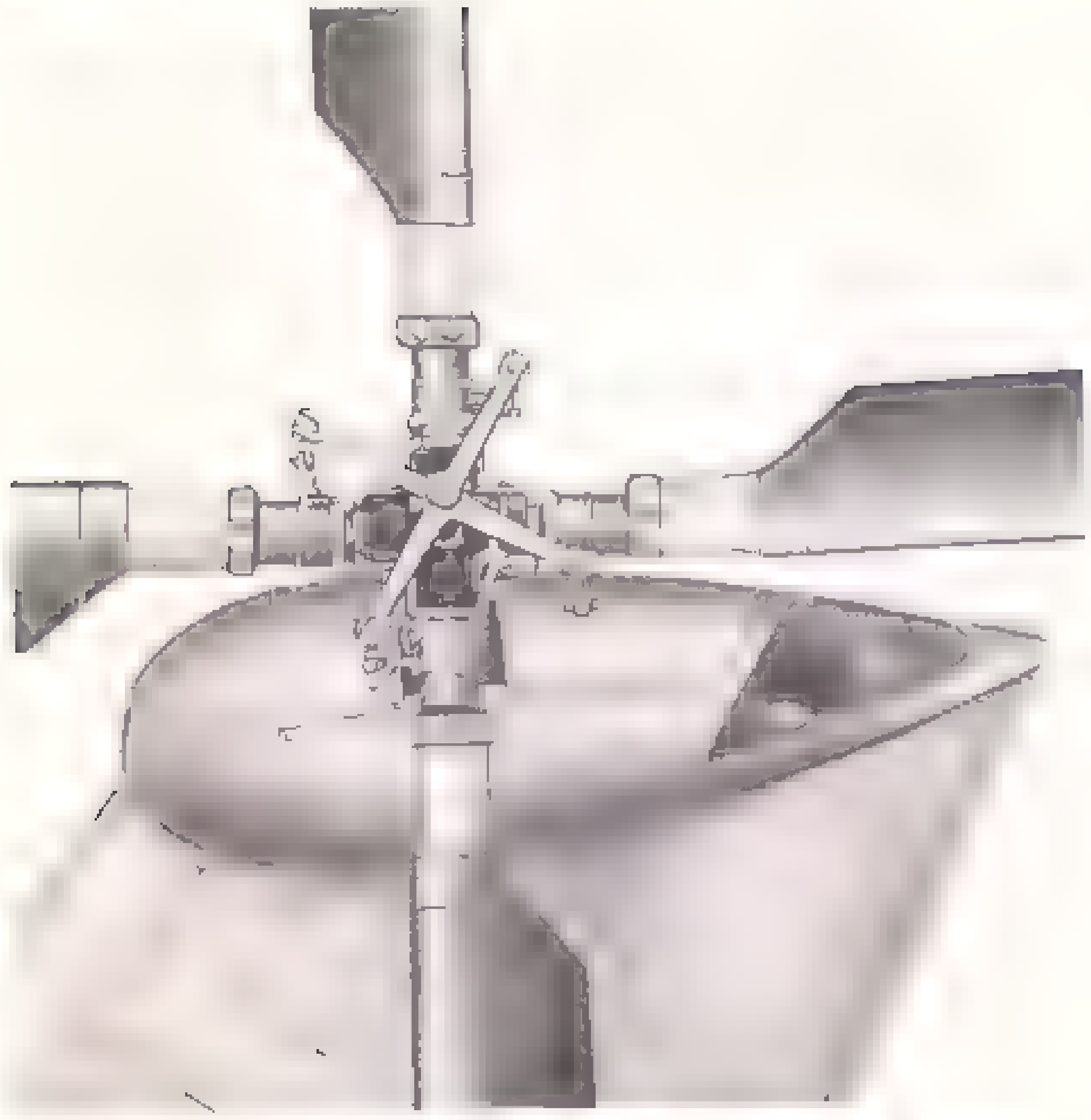


Figure 8–9. Tail rotor assembly installed (without counterweights)

weight assembly is completely automatic and no adjustment is necessary other than adjusting the length of the pitch change links while aligning the tail rotor blades. See figure 8–10 for a view of a tail rotor assembly with counterweights.

8–34. *Cleaning.* Clean metal components of the tail rotor hub with solvent (item 4, table 1–8) and dry thoroughly with a clean cloth.

Figure 8–10. Tail rotor assembly installed (with counterweights)

8–35. *Inspection. a.* With tail rotor installed, check for excessive play between the hub and spindle. Play is measured at the blade tip. With the blade in a horizontal position, hold hub stationary and check blade movement in the plane of rotation. Blade tip movement should not exceed 3/32 inch.

b. Check axial play of spindle, in and out from hub, with a dial indicator. Play should not exceed 0.025 inch.

8–36. Tail Rotor Blades. Each tail rotor blade is constructed of a sheet aluminum skin bonded to a solid aluminum leading edge spar, a honeycomb core, a trailing edge cap, and a tip cap. The skin is wrapped completely around the spar. The trailing edge cap is installed over the top edge of the skin at the trailing edge of the blade. The tip cap is riveted to the outer edge of the blade. Each blade is bolted through the root end of the spar to the sleeve of the spindle.

Warning

Part No. S1615-30000 series tail rotor blades and part No. S1615-30100 series tail rotor blades are not interchangeable with each other and one must never be substituted for the other. Part No. S1615-30100-2, -8, and -8X tail rotor blades are interchangeable and any combination of these tail rotor blades may be used. Part No. S1615-30100-4 tail rotor blades must never be used in combination with part No. S1615-30100-2, -8, or -8X tail rotor blades. Any part No. S1615-30000 series tail rotor blade is interchangeable with any other part No. S1615-30000 series tail rotor blade, and any combination of this series tail rotor blade is permissible.

Note

Tail rotor blades bearing part No. S1615-30100-8X have been inspected and X-rayed by the manufacturer for possible shifting of the honeycomb filler from the trailing edge of the spar. These blades have been found suitable for continued service.

8–37. *Cleaning.* Clean tail rotor blades with mild soap (item 14, table 1–8) and fresh water followed by a clean, fresh water rinse.

Warning

Never use solvents or cleaners, such as lacquer thinner, naphtha, carbon tetrachloride, or other organic compounds to clean the tail rotor blades. These compounds will weaken the bonding of the blades.

8–38. *Inspection. a.* Inspect tip cap, pocket, root fairing, and root fairing cap for sharp or deep dents, corrosion, cracks, or holes.

b. Visually inspect both sides of pocket at spar for bond separation.

Caution

Do not check bonded areas of pocket for bond separation by tapping with a coin or other object.

c. Inspect spar for corrosion, cracks, deep dents, or sharp scratches or nicks.

d. Inspect outer surface of cuff for corrosion, cracks, and sharp scratches or nicks.

e. Inspect all rivets on tail rotor blade for loose condition.

8–39. *Repair or Replacement.* Repair of tail rotor blade is limited to replacement of tip cap. Replace tip cap as follows:

a. Using a 1/16-inch diameter drill, remove head of 1/16-inch diameter rivet securing trailing edge portion of tip cap to tail rotor blade. Remove rivet.

Note

Do not drill through the rivets unless a drill smaller than the rivet diameter is used.

b. Using a 1/8-inch diameter drill, remove heads of four top and bottom 1/8-inch diameter blind rivets and leading edge rivets securing tip cap to tail rotor blade. Remove rivets.

Caution

Do not damage the balance weight of blade rib or spar at the tip end of the blade during the drilling and rivet removal procedure.

c. Remove tip cap from tail rotor blade.

d. In order to transfer rivet holes in tip rib of blade to a new and undrilled tip cap, make hole locations layout on blade skin and tip cap as described in steps (1) through (3) below.

(1) Draw a pencil line spanwise from center of each rivet hole in tip rib approximately 2 inches long on skin on both sides of blade and toward root end of blade. Keep pencil lines parallel to leading edge of blade.

(2) Draw a chordwise pencil line on both sides of tip cap 1/4 inch from inboard or straight edge of cap.

(3) Place tip cap in position on tip end of blade and extend pencil lines on blade skin across chordwise pencil line on tip cap. The points on the tip cap where the pencil lines bisect each other indicates the location of the rivet holes to be drilled.

e. With tip cap removed from tail rotor blade, center punch and drill holes at each bisector point as follows: No. 51 (0.067-inch diameter) lined through at the trailing edge hole location and countersunk 100 degrees x 0.114-inch diameter at both sides, No. 30 (0.128-inch diameter) in the next four top and bottom rivet locations and countersunk 100 degrees x 0.216-inch diameter, and a No. 30 (0.128-inch diameter) lined through the leading edge hole location of the tip cap and countersunk 100 degrees x 0.225-inch diameter on both sides. Remove all burrs from tip cap holes.

f. Remove old adhesive from mating surface of tip cap and tip end of blade with a clean cloth moistened with thinner (item 57, table 1–8). Wipe areas dry with a clean, dry cloth.

Warning

Do not allow any lacquer thinner to seep into the bonded area. Lacquer thinner is a solvent and will weaken the bond between the pocket and the spar.

g. Apply two coats of adhesive (item 41, table 1–8) to mating surfaces of tip cap and tip end of blade. Allow first coat to dry approximately 30 minutes before applying second coat. Allow second coat to dry approximately 5 minutes before placing tip cap on tail rotor blade.

Note

The adhesive used on the tip cap acts only as an air and moisture seal. It does not serve, in any way, as a bonding agent.

h. When tip rib holes are oversize due to drilling out rivets, etc, fabricate shims from aluminum alloy sheet (condition T6) (item 76, table 1–8) in accordance with table 8–2. Install and bond shims on inside of tip rib, using adhesive, (item 41, table 1–8) as instructed in step *g* above. Trim shim for extreme trailing edge hole to match rib angle cut. Shimming is not required for four holes in tip bracket area.

Note

This applies to oversized rib holes only. When the tip cap holes are oversize, but the rib holes are not, the tip cap will be replaced.

i. Attach tip cap to tail rotor blade at trailing edge hole with one AN426AD2 rivet, at next four consecutive top and bottom holes with MS20601AD4-2 blind rivets, and at lead edge hole with AN426AD4 rivet.

j. Paint new tip cap in accordance with instructions in paragraph 8–40.

8–40. *Painting.* If tail rotor blade tip cap requires painting, proceed as follows:

a. Mask off spar and pocket of tail rotor blade.

b. Spray tip cap with one light coat of primer coating (item 19, table 1–8).

Note

Allow the primer coating to dry approximately 30 minutes before applying lacquer (color 619) (item 75, table 1–8).

Table 8–2. Rear shims

RIVET	DRILL SIZE	HOLE SIZE	SHIM SIZE
0100V4A	No. 27(0.144 inch)	0.144/0.147 inch	0.020 x 1/2 x 1/2 inch
100V5A	No. 20(0.161 inch)	0.1595/0.1635 inch	0.040 x 1/2 x 1/2 inch
0100V5A	No. 17(0.173 inch)	0.173/0.176 inch	0.040 x 1/2 x 1/2 inch

c. Spray tip cap with one light coat of lacquer (color 619) (item 75, table 1–8).

8–41. Adjustment. a. Align tail rotor blades without counterweights as follows:

Note

The rigging protractor assembly, part No. S1670-10566, FSN 5210-795-1063, cannot be used on helicopter without counterweights.

(1) Secure tail rotor blades in center of their flapping range (0-degree flapping) by installing a blade restrainer, part No. S1670-10650-13, FSN 1730-659-5259, to tail rotor assembly.

Note

If a blade restrainer is not available, phenolic or wood wedges may be inserted between the spindle and the hub to keep the blades in center of this flapping range.

(2) Measure length of pitch change link assembly. (See figure 8–11.) The length should be approximately 4-9/16 inches with rod ends at 60 degrees from each other. (See figure 8–11.)

(3) Place a suitable protractor on tail rotor pitch change shaft and establish a zero reference on protractor if helicopter is not level laterally.

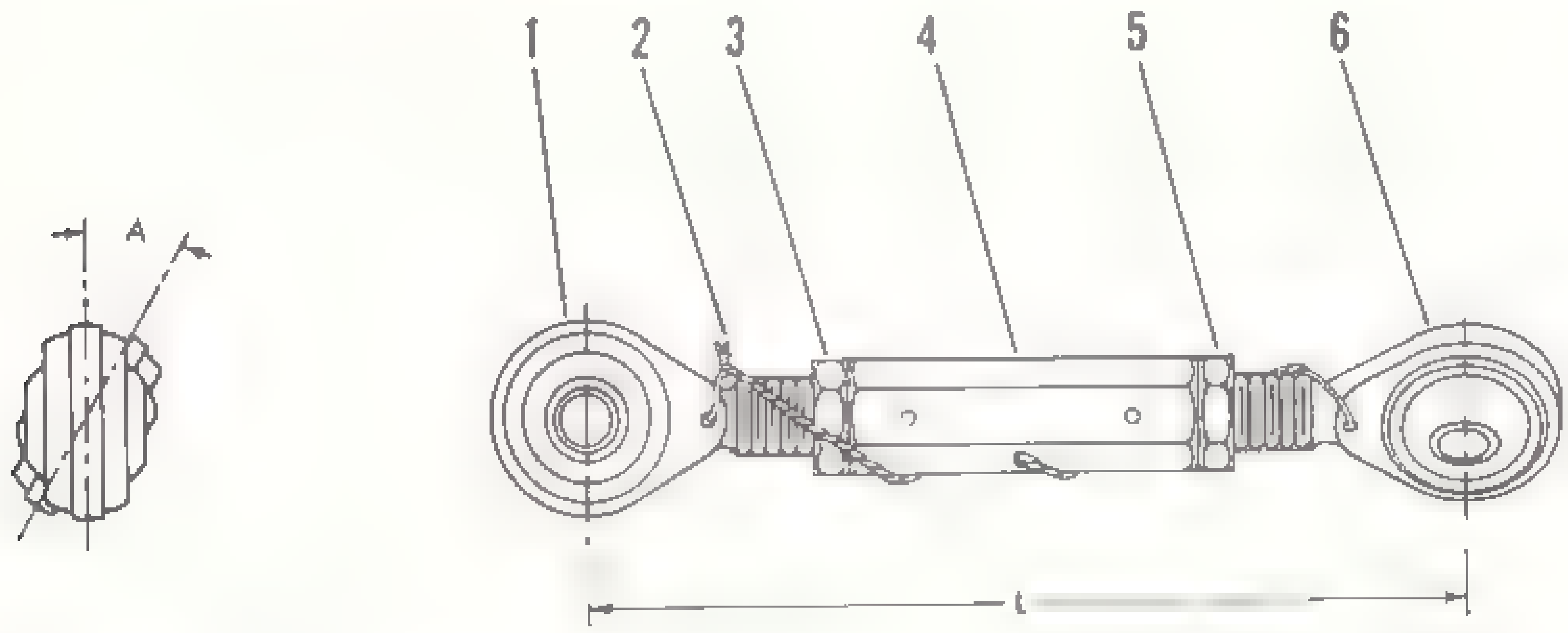
Note

If protractor is not available, or the protractor is not capable of being set, the pitch change shaft must be leveled. This may be accomplished by leveling the helicopter. (Refer to paragraph 1–49.)

(4) Move left rudder pedal fully forward until power piston bottoms internally in tail rotor servo. Check that mechanical stops are not hitting at this time.

(5) Rotate tail rotor until one blade is pointing forward. Place a level on leading edge and insure that leading edge is level.

(6) Place protractor on flat of sleeve (figure 8–12) just outboard of two blade attaching bolts. Measure



	PITCH CHANGE LINK ASSEMBLY	COUNTERWEIGHT LINK ASSEMBLY
A	60°	53°
L	4-9/16 INCHES	4-3/8 INCHES

NOTE

THE 4-$\frac{9}{16}$ INCH APPROXIMATE LENGTH OF THE PITCH CHANGE LINK ASSY IS SUBJECT TO ADJUSTMENT OF ROTOR RIGGING. THE 4-$\frac{3}{8}$ INCH LENGTH OF THE COUNTERWEIGHT LINK ASSY IS PREDETERMINED AND FIXED.

1. Rod End
2. Safety Wire
3. Check Nut
4. Link
5. Check Nut
6. Rod End

Figure 8–11. Pitch change link and counterweight link assembly

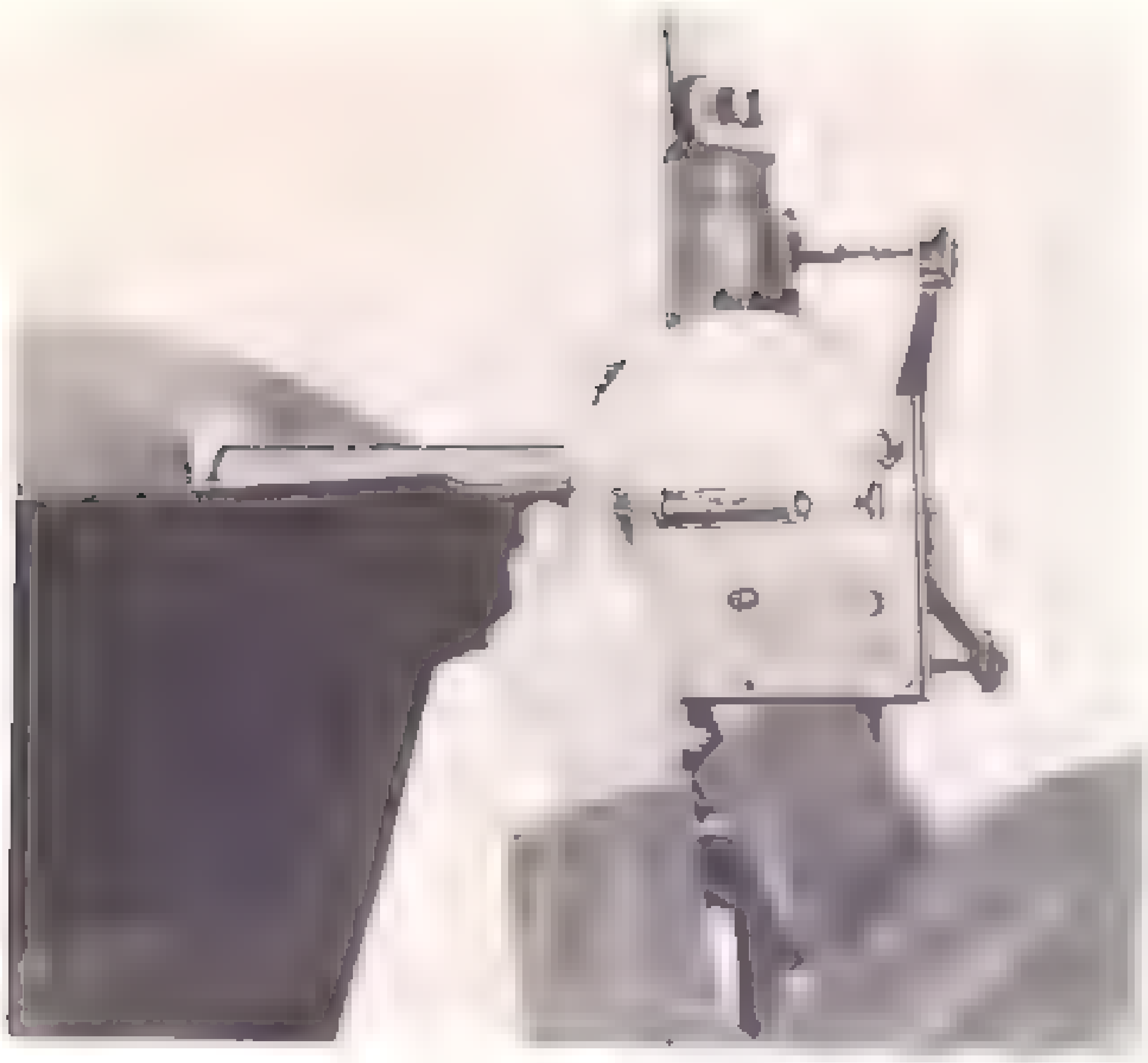


Figure 8–12. Measuring pitch on tail rotor blade

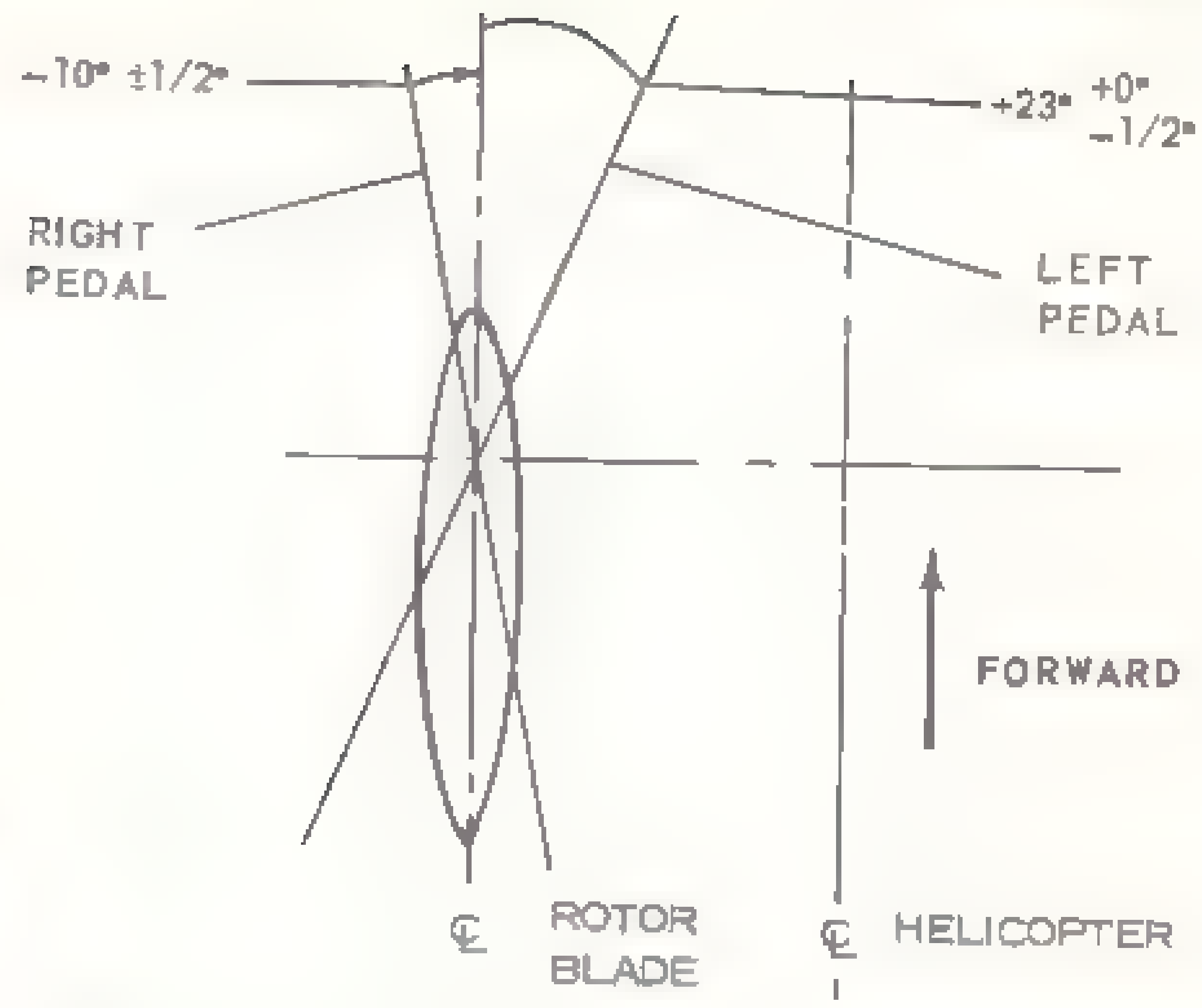


Figure 8–13. Tail rotor rigging angles (without counterweight)

blade for a reading of + 23 + 0 – 1/2 degrees. (See figure 8–13.)

Note

When the leading edge of the forward blade points inboard toward the fuselage, the angle of the blade with respect to vertical is known as a plug angle and the blade is in left rudder position. When the leading edge points outboard away from the fuselage, the angle from vertical is a minus angle and the blade is in right rudder position.

When checking the tail rotor blade angles, remove any free play that exists in the bearings on the pitch change links at the blades and in the gear box by manually pushing the leading edge of the blade in the direction of the fuselage.

(7) Adjust pitch change link from pitch change beam, if necessary, to obtain blade angle. Tighten attaching nut to a torque of 40 to 60 inch-pounds.

Note

If sufficient adjustment is not available on the pitch change links, the piston stops on the tail rotor servo must be adjusted and the left rudder mechanical stop must have a 0.010-inch clearance.

(8) Repeat procedures outlined in steps (4) through (7) above for other three blades.

(9) Move right rudder pedal fully forward until power piston bottoms internally in tail rotor servo. Check that mechanical stops are not hitting at this time.

(10) Rotate tail rotor until one blade is pointing forward. Place a level on leading edge and insure that leading edge is level.

(11) Place protractor on flat of blade sleeve just outboard of two blade attaching bolts. Measure blade angle for a reading of –10 ± 1/2 degrees. (See figure 8–13.)

(12) If necessary, adjust tail rotor servo adjustable stop to obtain proper blade angle.

Note

For right rudder, it is necessary to check only one blade.

(13) Secure check nuts (3 and 5, figure 8–11) and secure rod ends (1 and 6) to link (4) with safety wire (2) on the pitch change link assemblies as shown in figure 8–11.

b. Align tail rotor blades with counterweights as follows:

Note

If a rigging protractor assembly, part No. S1670-10566, FSN 5210-795-1063, is available, follow the procedure outlined in steps (1) through (12) below and omit steps (13) through (22) below. If a rigging protractor assembly, part No. S1670-10566, FSN 5210-795-1063, is not available, omit steps (4) through (12) below and follow the procedure outlined in steps (1) through (3) and (13) through (24) below.

(1) Secure blades in center of their flapping range (0-degree flapping) by installing a blade restrainer, part No. S1670-10650-13, FSN 1730-659-5259, to tail rotor assembly.

Note

If a blade restrainer is not available, phenolic or wood wedges may be inserted between the spindle and the hub to keep the blades in center of their flapping range.

(2) Measure and adjust counterweight link assemblies if necessary. Adjust length of each counterweight link assembly to 4-3/8 inches with rod ends at 53 degrees from each other. (See figure 8–11.)

Note

The 4-3/8-inch length of the counterweight link assembly is predetermined and fixed. Rigging the counterweights is accomplished by setting the blade angle at 0-degree coning (flapping) angle and 0-degree blade pitch, and by setting the length of the counterweight link assemblies from the blades to the counterweights at 4-3/8 inches. This positions the counterweights at 0-degree angle.

(3) Measure length of pitch change link assembly. (See figure 8–11.) The length should be approximately 4-9/16 inches with control rod ends at 60 degrees from each other. (See figure 8–11.)

(4) Move left rudder pedal fully forward until power piston bottoms internally in tail rotor servo. Check that mechanical stops are not hitting at this time.

(5) Mount rigging protractor assembly, part No. S1670-10566, FSN 5210-795-1063, on blade restrainer, part No. S1670-10650-13, FSN 1730-659-5259, at aft blade with that blade in a horizontal position. Install slide in slot of rigging protractor with side marked 30° LEFT facing blade hub and engraved side of slide facing outboard. Move slide against blade hub and tighten thumbscrew. (See figure 8–14.)

Figure 8–14. Setting the blade pitch

Note

The rigging protractor assembly, part No. S1670-10566, FSN 5210-795-1063, can be used only in conjunction with blade restrainer, part No. S1670-10650-13, FSN 1730-659-5259. When checking the tail rotor blade angles, remove any free play that exists in the bearing on the short links at the blades and in the gear box, by manually pushing the leading edge of the blade in the direction of the fuselage.

(6) Adjust pitch change link from pitch change beam as required to bring blade hub flush with angled surface of slide. Tighten attaching nut to a torque of 40 to 60 inch-pounds.

Note

If sufficient adjustment is not available on the pitch change links, the piston stops on the tail rotor servo must be adjusted and the left rudder mechanical stop must have a 0.010-inch clearance.

(7) Repeat steps (4) through (6) align for each of remaining blades.

(8) Loosen thumbscrew. Remove slide from slot in rigging protractor.

(9) Move right rudder pedal fully forward until power piston bottoms internally in tail rotor servo. Check that mechanical stops are not hitting at this time.

(10) Install slide with side marked 20° RIGHT facing blade hub and engraved side facing outboard. Tighten thumbscrew.

(11) If necessary, adjust tail rotor adjustable stop to bring blade hub flush with angled surface of slide.

Note

For right rudder, it is necessary to check only one blade.

(12) Remove rigging protractor from blade restrainer.

(13) Place suitable protractor on tail rotor pitch change shaft and establish zero reference on protractor if helicopter is not level laterally.

Note

If a protractor is not available, or the protractor is not capable of being set, the pitch change shaft must be leveled. This may be accomplished by leveling the helicopter.

(14) Move left rudder pedal fully forward until power piston bottoms internally in tail rotor servo. Check that mechanical stops are not hitting at this time.

(15) Rotate tail rotor until one blade is pointing forward. Place a level on leading edge and insure that leading edge is level.

(16) Place protractor on flat of blade sleeve (figure 8–12) just outboard of two blade attaching bolts. Measure blade angle for a reading of +30 +1/2 –1 degrees. (See figure 8–15.)

Note

When the leading edge of the forward blade points inboard toward the fuselage, the angle of the blade with respect to vertical is known as a plus angle and the blade is in left rudder position. When the leading edge points outboard away from the fuselage, the angle from vertical is a minus angle and the blade is in right rudder position.

When checking the tail rotor blade angles, remove any free play that exists in the bearings on the pitch change links at the blade and in the gear box by manually pushing the leading edge of the blade in the direction of the fuselage.

(17) Adjust pitch change link from pitch change beam, if necessary, to obtain blade angle. Tighten attaching nut to a torque of 40 to 60 inch-pounds.

Note

If sufficient adjustment is not available on the pitch change links, the piston stops on the tail rudder servo must be adjusted and the left rudder mechanical stop must have a 0.010-inch clearance.

(18) Repeat procedures outlined in steps (14) through (17) above for each of remaining blades.

(19) Move right rudder pedal fully forward until power piston bottoms internally in tail rotor servo. Check that mechanical stops are not hitting at this time.

(20) Rotate tail rotor until one blade is pointing forward. Place a level on leading edge and insure that leading edge is level.

(21) Place protractor on flat of blade sleeve (figure 8–12) just outboard of two blade attaching bolts. Measure blade angle for a reading of –20 + 1 –3 degrees. (See figure 8–15.)

(22) If necessary, adjust tail rotor servo adjustable stop to obtain proper blade angle.

Note

For right rudder, it is necessary to check only one blade.

On helicopters with counterweights, failure to get +30 +1/2 –1 degrees left rudder and –20 +1 –3 degrees right rudder may be an indication that internal stops have not been removed from the tail rotor servo.

(23) Secure check nuts (3 and 5, figure 8–11) and secure rod ends (1 and 6) to link (4) with safety

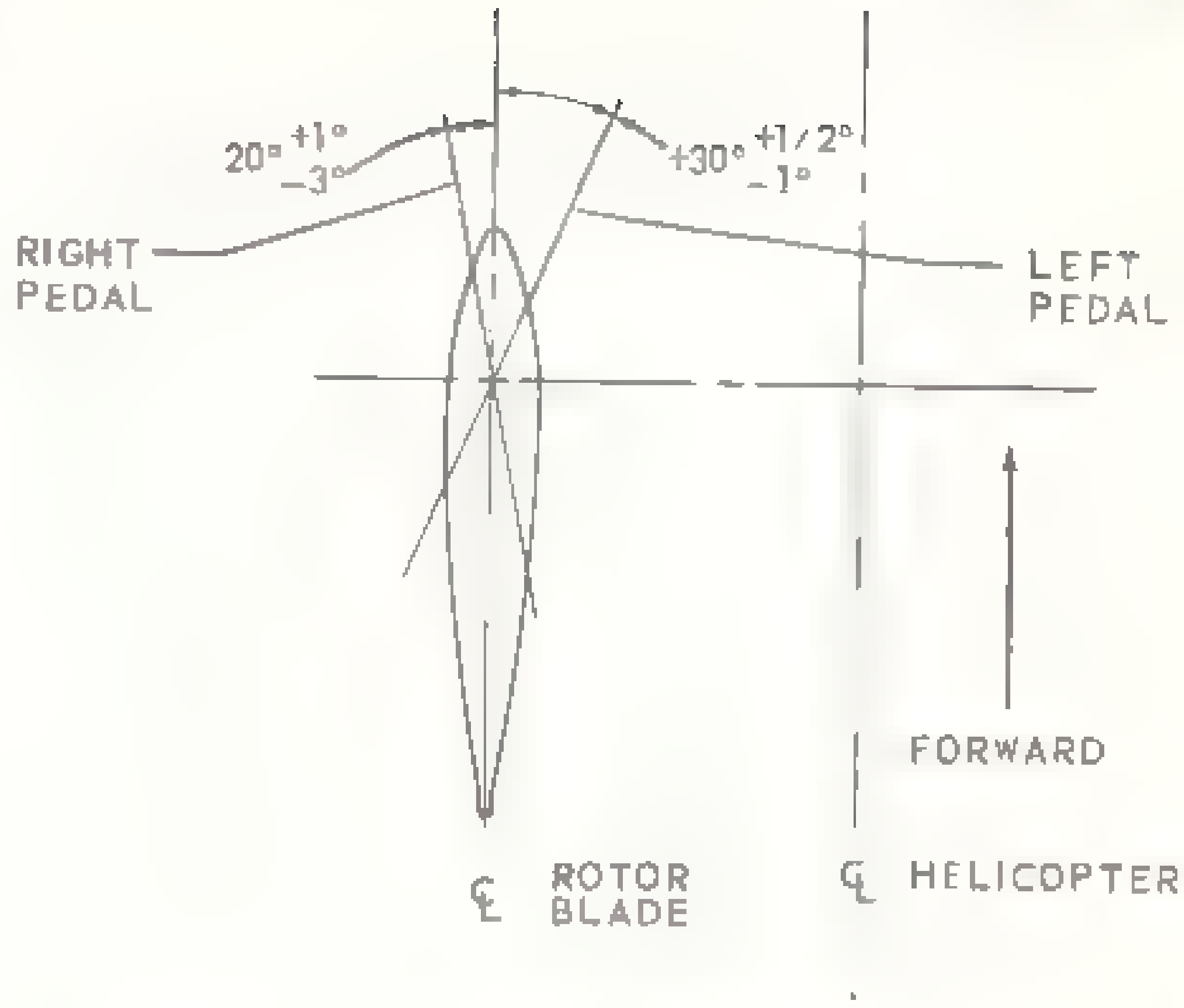


Figure 8–15. Tail rotor rigging angle (with counterweight)

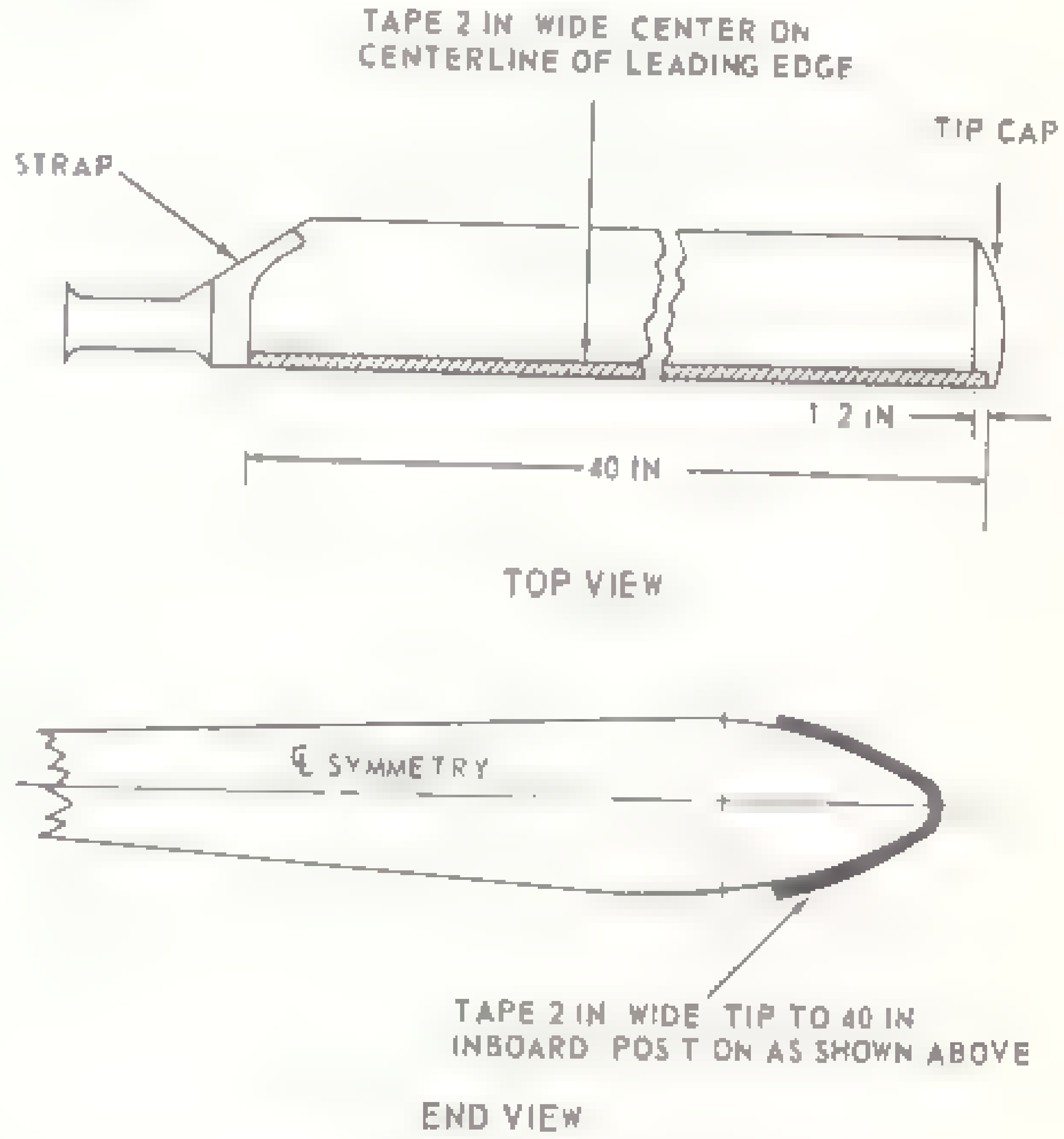


Figure 8–16. Position of vinyl tape

wire (2) on pitch change link assemblies and counterweight link assemblies as shown in figure 8–11.

(24) Remove blade restrainer assembly or wedges from tail rotor blade.

8–42. *Leading Edge Erosion Protection.* When normal operation of helicopter is in a sandy or dusty geographical region, protect leading edge of tail rotor blades with protective tape as follows:

a. Clean surface of leading edge of each tail rotor blade with a solution of mild soap (item 14, table 1–8) and water only.

b. After surface has dried, apply a 2-inch wide by 40-inch long strip of vinyl plastic pressure sensitive tape (item 78, table 1–8) to leading edge of each tail rotor blade. (See figure 8–16.) Center tape on centerline of blade leading edge, starting 1/2 inch outboard of the line defining attachment of blade tip cap.

Warning

Do not cut tape on blade.

Note

Clean hands before handling tape.

c. Check condition of tape prior to each flight. Replace tape when worn through or when edges are loose.

Caution

This tape is not recommended for rain erosion protection and should be inspected for condition if rain is encountered.

CHAPTER 9
FLIGHT CONTROLS

Section I Scope

9–1. Purpose. The purpose of this chapter is to provide the essential information for maintenance personnel to accomplish organizational maintenance of the flight controls in accordance with the Maintenance Allocation Chart. (Refer to Appendix II.)

9–2. Description. The flight controls for the CH-34 helicopter consist of the moveable flight controls only. The fixed flight controls are not applicable.

Section II Moveable Flight Controls

9–3. Description. The moveable flight controls (figure 9–1) consist of the main rotor control system and tail rotor control system.

9–4. Main Rotor Control System. The main rotor control system (figure 9–2) consists of the cyclic pitch control system, collective pitch control system, main servo assemblies (11, 14, and 16), auxiliary servo assembly (8) and mixer assembly (9). The main rotor control system receives a power assist from the primary hydraulic system through the main servo assemblies or from the auxiliary hydraulic system through the auxiliary servo assembly if the primary hydraulic system malfunctions. (Refer to paragraph 6–6 through 6–30 for the flight controls hydraulic systems.)

9–5. *Cyclic Pitch Control System.* The cyclic pitch control system provides directional control for the helicopter and consists of the copilot's and pilot's cyclic pitch control sticks (29 and 44, figure 9–2) which are mounted on socket and yoke assemblies (30 and 45). The socket and yoke assemblies are connected by control rods, bellcranks, and arm assemblies through the mechanical linkage of the auxiliary servo assembly (8) and mixer assembly (9) to the main servo assemblies (11, 14, and 16). Two magnetic brakes (32 and 34) and two cylinders (31 and 35), located in the left side of the clutch compartment, provide control stick feel and return the control stick to the position for which it was set. The magnetic brakes are electrically controled by a switch on the overhead switch panel in the pilots compartment. The grips of each cyclic pitch control stick contains a microphone, radio, cargo release, and stick trim switch.

a. Cleaning. Clean components of the cyclic pitch control system with a clean lint free cloth moistened with solvent (item 4, table 1–8).

b. Inspection. (1) Inspect cyclic pitch control sticks for cracks, dents, and security of attachment.

(2) Inspect control rods for cracks, dents, bends, and corrosion; bearings in each rod end for free and easy movement.

(3) Inspect bellcranks for cracks, dents, bends, and elongated bolt holes.

(4) Inspect magnetic brakes for dents, cracks, and security of attachment.

(5) Inspect cylinders for cracks, dents, and security of attachment.

9–6. *Collective Pitch Control System.* The collective pitch control system provides vertical control for the helicopter and consists of the pilot's and copilot's collective pitch control sticks (1 and 6, figure 9–2), torque shaft assembly (5), arms (2 and 3), and control rods (4 and 7). Movement of either collective pitch control stick actuates the auxiliary servo assembly (8) and mixer assembly (9) so that all main servo assemblies (11, 14, and 16) are actuated at one time and the pitch of all four blades are increased or decreased equally and simultaneously.

a. Cleaning. Clean components of the collective pitch control system with a clean lint free cloth moistened with solvent (item 4, table 1–8).

b. Inspection. (1) Inspect collective pitch control sticks for cracks, dents, bends, and security of attachment.

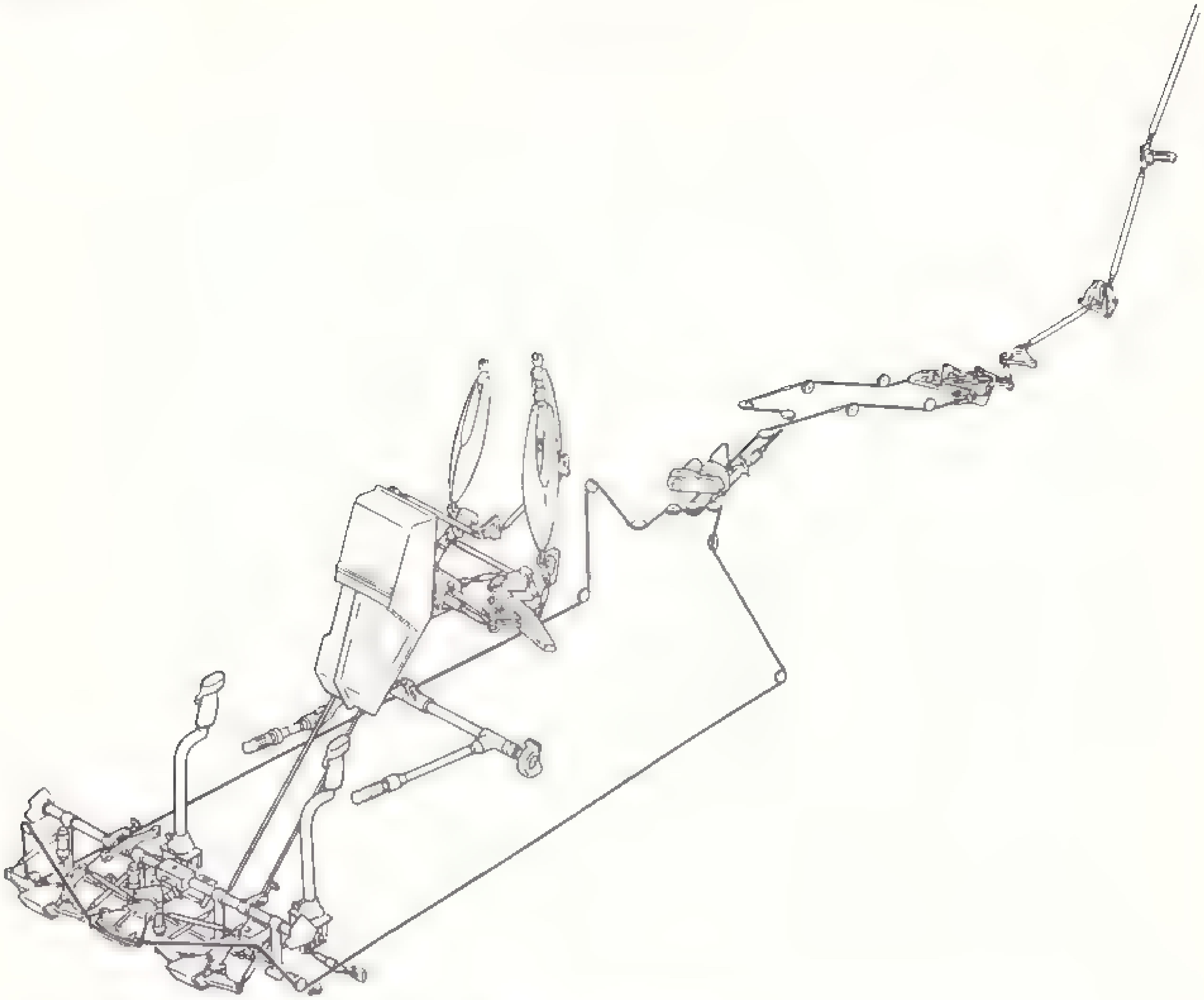


Figure 9—1 Movable flight controls

(2) Inspect arms for cracks, bends, and security of attachment.

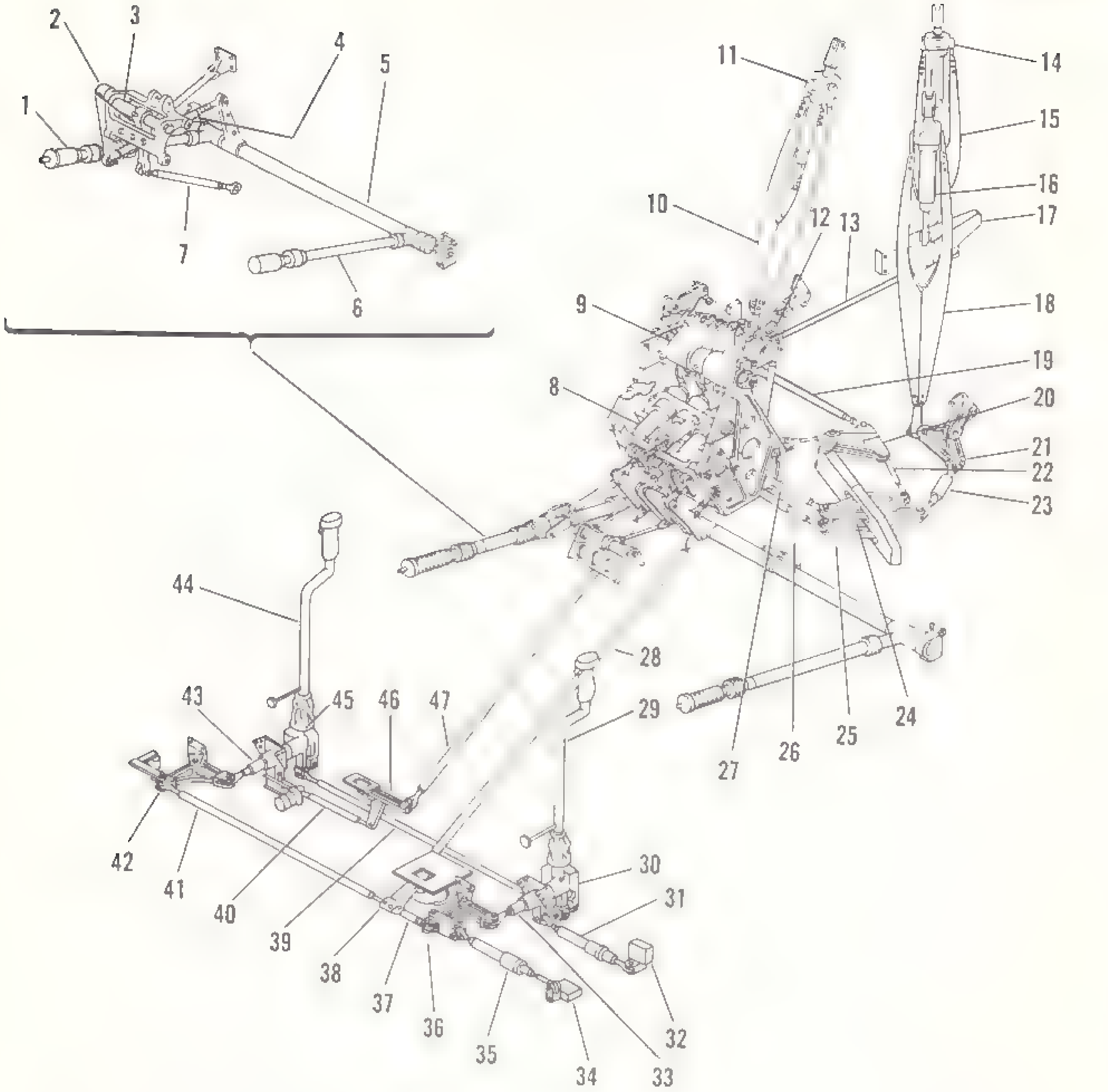
(3) Inspect control rods for cracks, dents, bends, and corrosion; bearings in each rod end for free and easy movement.

9—7. *Main Servo Assemblies.* Three main servo assemblies (11, 14, and 16, figure 9—2) are used in the main rotor control system. Each main servo assembly consists of a housing, yoke, power piston, and pilot valve. The fork at the upper end of each main servo assembly is attached to a trunnion on the stationary star assembly and the power piston at the lower end is attached to a lug on the main transmission assembly. Arm assemblies (10, 15, and 18) are attached to the yokes of the main servo assemblies. Two hose assemblies connect each main servo assembly to the flight controls hydraulic system.

a. Cleaning. Clean main servo assemblies with a clean lint free cloth moistened with solvent (item 4, table 1—8).

b. Inspection. Inspect main servo assemblies for dents, cracks, and security of attachment.

9—8. *Auxiliary Servo Assembly.* The auxiliary servo assembly (8, figure 9—2) is located on the pilot's compartment bulkhead between the pilot's and copilot's seat. The auxiliary servo assembly consists of three power pistons necessary for control of the main rotor assembly by the auxiliary hydraulic system, three pilot valves for control of the power piston and torque shaft which rotates to bypass hydraulic fluid when the auxiliary hydraulic system is shut off; and on model CH-34C, three servo motor assemblies for control of the pilot valve and power pistons by the automatic stabilization equipment. The power pistons are con-



1. Pilot's Collective Pitch Control Stick
2. Arm
3. Arm
4. Control Rod
5. Torque Shaft Assembly
6. Copilot's Collective Pitch Control Stick
7. Control Rod
8. Auxiliary Servo Assembly
9. Mixer Assembly
10. Arm Assembly
11. Main Servo Assembly
12. Bellcrank
13. Control Rod
14. Main Servo Assembly
15. Arm Assembly
16. Main Servo Assembly
17. Support
18. Arm Assembly
19. Control Rod
20. Bellcrank
21. Bellcrank
22. Control Rod
23. Control Rod
24. Bellcrank
25. Bellcrank
26. Control Rod
27. Control Rod
28. Control Rod
29. Copilot's Cyclic Pitch Control Stick
30. Socket and Yoke Assembly
31. Cylinder
32. Magnetic Brake
33. Control Rod
34. Magnetic Brake
35. Cylinder
36. Bellcrank
37. Control Rod
38. Bellcrank
39. Control Rod
40. Control Rod
41. Control Rod
42. Bellcrank
43. Control Rod
44. Pilot's Cyclic Pitch Control Stick
45. Socket and Yoke Assembly
46. Bellcrank
47. Control Rod

Figure 9—2. Main rotor flight control system (Sheet 1 of 2)

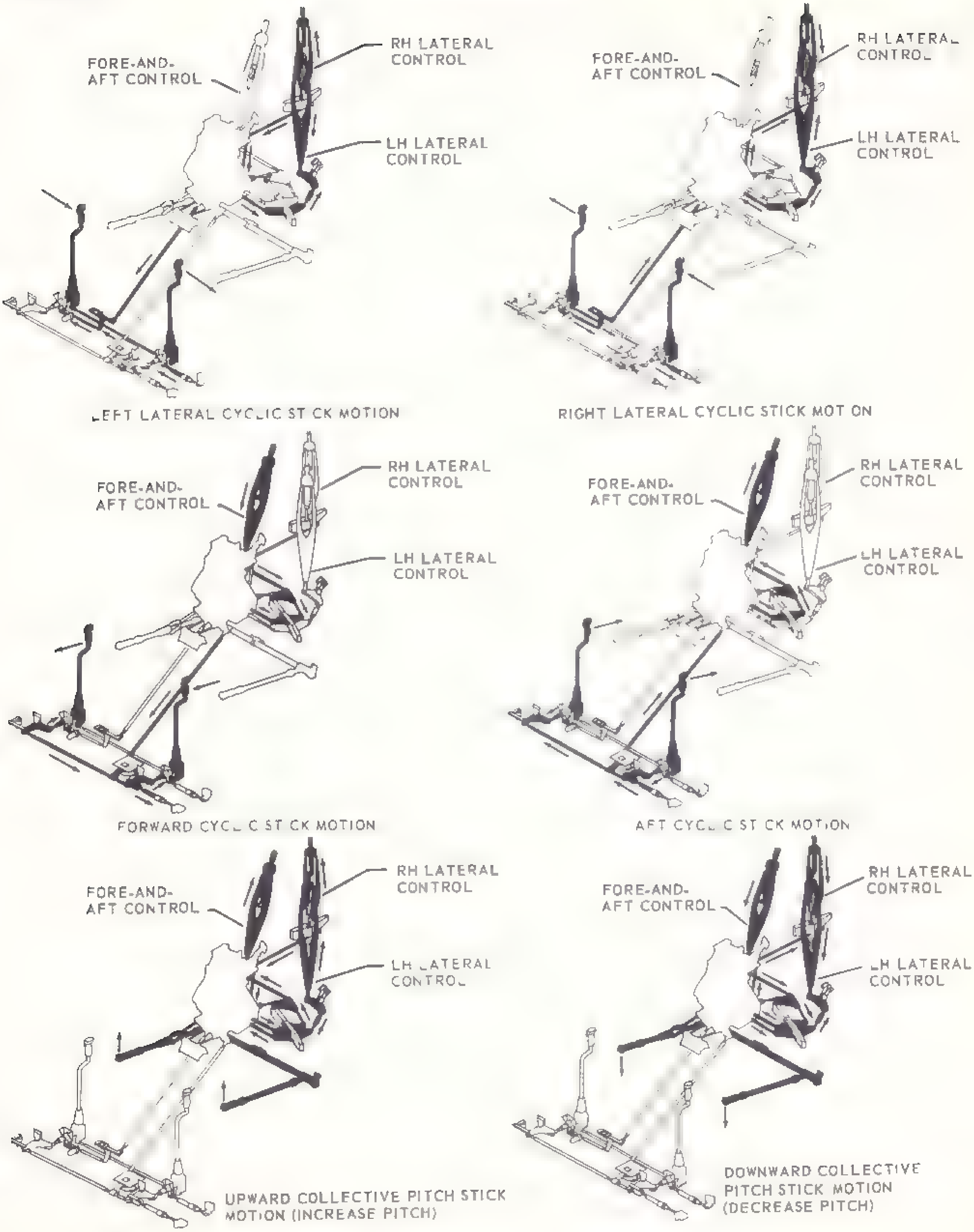


Figure 9–2. Main rotor flight control system (Sheet 2 of 2)

trolled by the movement of the pilot valves which move in sloppy links to direct the hydraulic fluid to either side of the power piston for movement of the controls. Movement of the pilot valves is accomplished manually through the main rotor flight controls or electronically and mechanically by the automatic stabilization equipment and servo motor assemblies.

a. Cleaning. Clean auxiliary servo assembly with a clean, lint free cloth moistened with solvent (item 4, table 1–8).

b. Inspection. Inspect auxiliary servo assembly for cracks, dents, security, and hydraulic fluid leakage.

9–9. Mixer Assembly. The mixer assembly (9, figure 9–2) is located above and connected to the auxiliary servo assembly (8). The purpose of the mixer assembly is to receive the mechanical movement of the cyclic and collective pitch control sticks and mix these movements into a single mechanical movement which is transmitted through mechanical linkage to the main rotor blades.

a. Cleaning. Clean mixer assembly with a clean, lint free cloth moistened with solvent (item 4, table 1–8).

b. Inspection. Inspect mixer assembly for dents, cracks, bends, and security of attachment.

9–10. Tail Rotor Control System. The tail rotor control system consists of the control pedals and support assemblies (23, figure 9–3), pedals adjustor assemblies (1), pedal damper assembly (21), forward quadrant (22), control rods (7, 18, 19, and 20), control cables (3, 5, 6, and 17), tail rotor servo assembly (4), aft quadrant (16), and bellcrank (8) which are located in the fuselage forward section and tail cone. Control rods (10, 12, 13, and 15), idlers (11 and 14) and bellcrank (9) are located in the pylon. The functions of the tail rotor control system are to compensate for the main rotor torque and to provide a means for changing the heading of the helicopter. The movement of the control pedals controls the movement of the tail rotor controls. The handle (2) of the pedals adjustor assembly can be turned to adjust the control pedals as desired by the pilot or copilot. The pedal damper assembly is connected to the control linkage below the forward quadrant to prevent sudden movement of the control pedals, which would cause sudden changes in thrust developed by the tail rotor and possible damage to the helicopter. The tail rotor servo assembly, mounted aft of the main transmission, provides a power boost to the movement of the tail rotor controls only while the auxiliary hydraulic system is operating. A much greater force will be required to move the control pedals when the auxiliary hydraulic system is not functioning.

9–11. Cleaning. Clean all components of the tail rotor control system with a clean, lint free cloth moistened with solvent (item 4, table 1–8).

9–12. Inspection. a. Inspect control pedals and support assemblies for cracks, bends, and security of attachment.

b. Inspect control rods for cracks, bends, dents, and security of attachment; rod end bearings for free and easy movement.

c. Inspect control cables for worn spots, broken wires, and corrosion especially where control cables are routed around pulleys and through fairleads.

d. Inspect forward and aft quadrants for dents, cracks, and security of attachment.

e. Inspect bellcranks and idlers for cracks, bends, and security of attachment.

f. Inspect tail rotor servo assembly for cracks, dents, and security of attachment.

9–13. Pedal Damper Assembly. The pedal damper assembly (7, figure 9–4) is located in the pilot's compartment below forward quadrant to the left of the pilot's control pedals. The pedal damper assembly prevents rapid movement of the control pedals which would result in abrupt changes and over control of the tail rotor. Except for a small amount of initial movement of the piston allowed by internal spring construction, the amount of resistance set up by the pedal damper varies directly with the rapidity of movement of the control pedals. The pedal damper incorporates a differential check valve to direct the flow of hydraulic fluid from the auxiliary hydraulic system to each side of a piston. Hydraulic fluid pressure of 1500 psi is supplied the pedal damper assembly by the auxiliary hydraulic system.

a. Operational Check. (1) With 1500 psi applied at auxiliary hydraulic system and a 50 pound load applied to control pedals, check for an elapsed time of 18 seconds ± 3 seconds for full travel of piston in pedal damper assembly from one extreme to other.

(2) Check springs in pedal damper assembly by rapidly applying load to control pedals. The control pedals should deflect approximately 1 inch at load application and spring back to their original position at release.

Note

If travel time is excessive, check control cables for binding.

(3) Check pedal damper assembly and hose assembly connection for leakage while hydraulic pressure is applied.

b. Removal. (1) Disconnect hose assembly (1, figure 9–4) from elbow (2) and plug end of hose assembly.

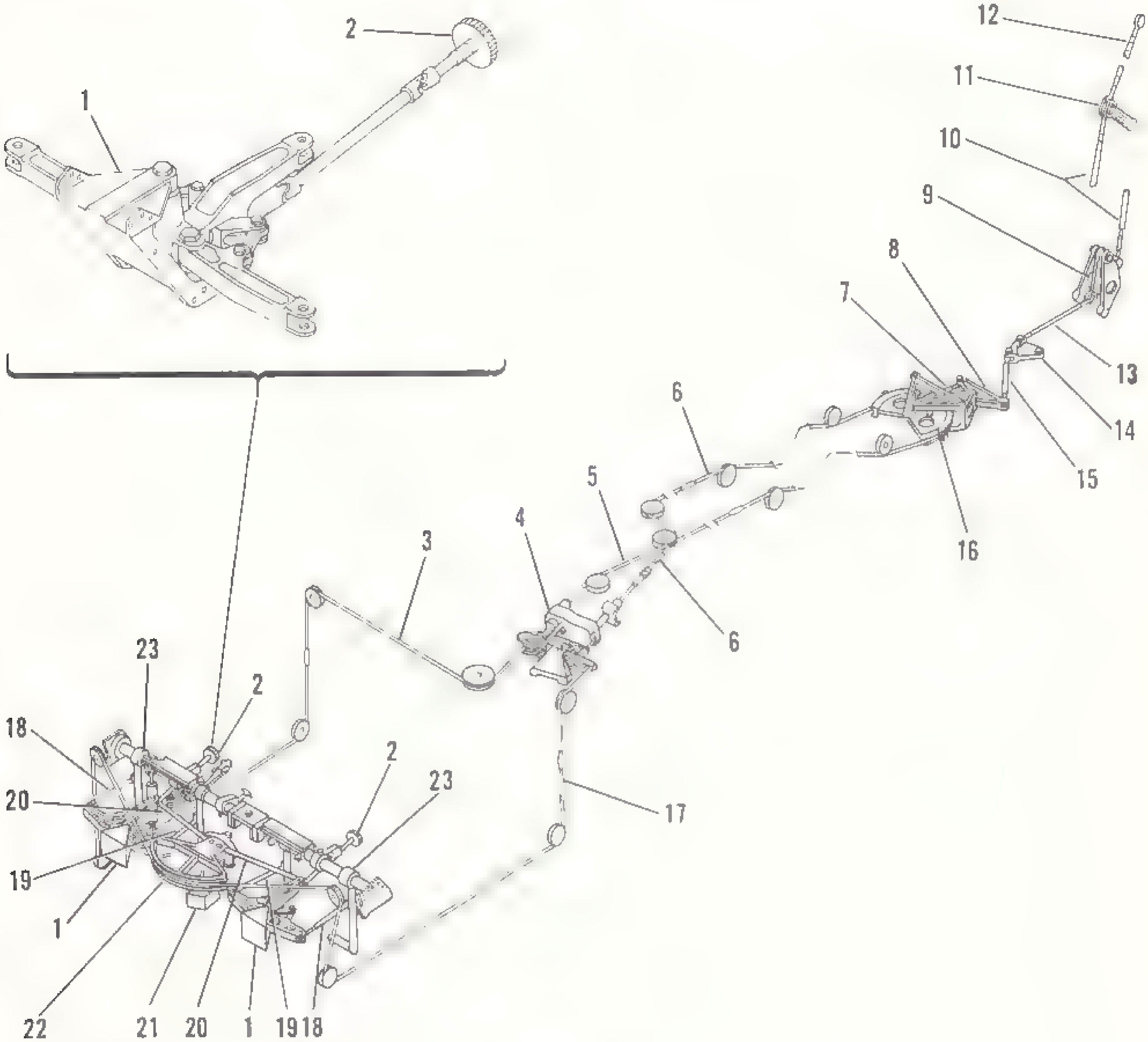
(2) Remove bolt (12), washers (9 and 11), and nut (8) securing fork of pedal damper assembly (7) to quadrant arm (10).

(3) Remove trunnion (5), washers (6), and shim (4) securing pedal damper assembly (7) in trunnion assembly (3). Remove pedal damper assembly from trunnion assembly.

(4) Loosen nut (15) and remove elbow (2), washer (14), and gasket (13) from pedal damper assembly (7).

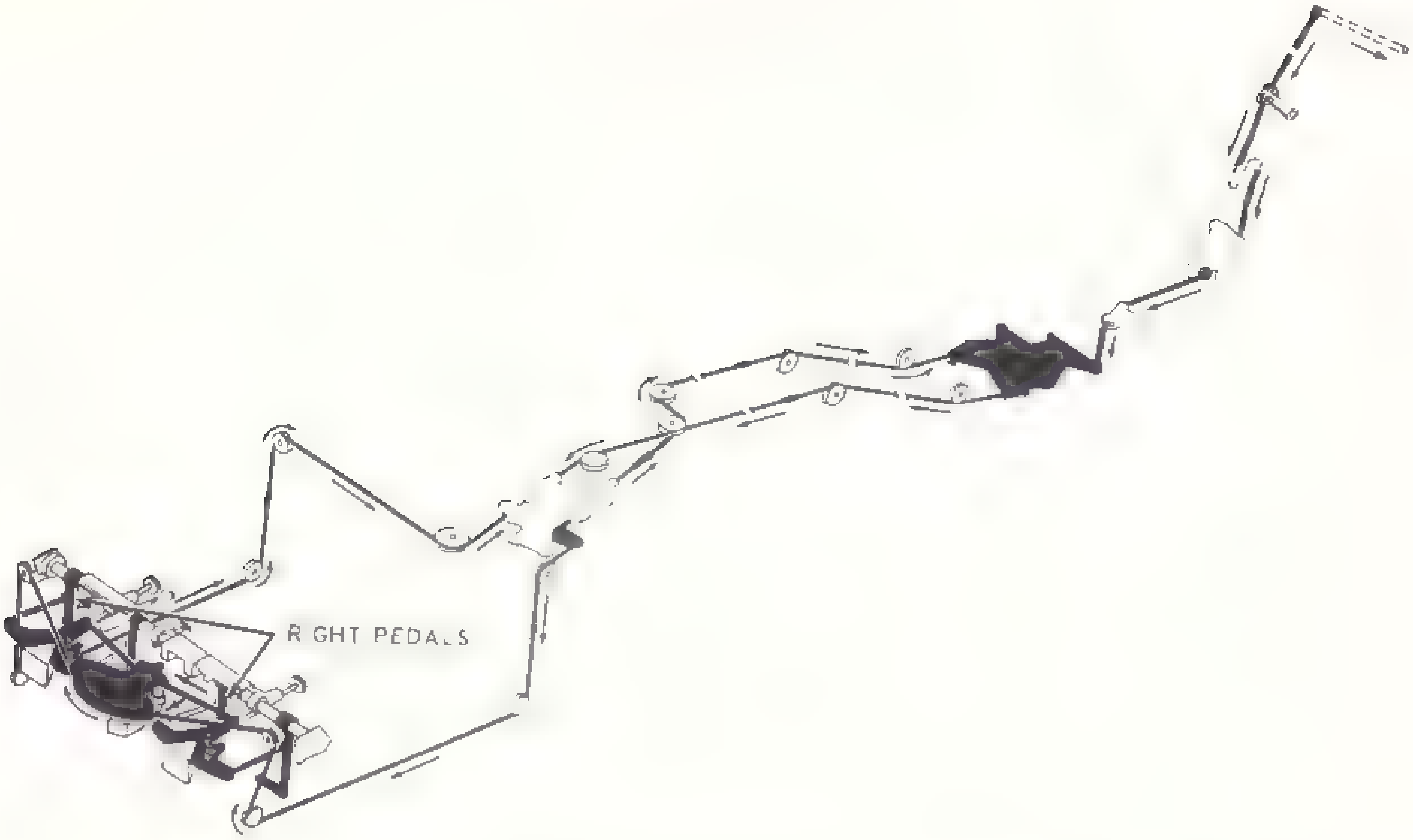
(5) Plug open port of pedal damper assembly (7).

c. Cleaning. Clean pedal damper assembly with solvent (item 4, table 1–8) and dry with filtered, compressed air or a clean, lint free cloth.

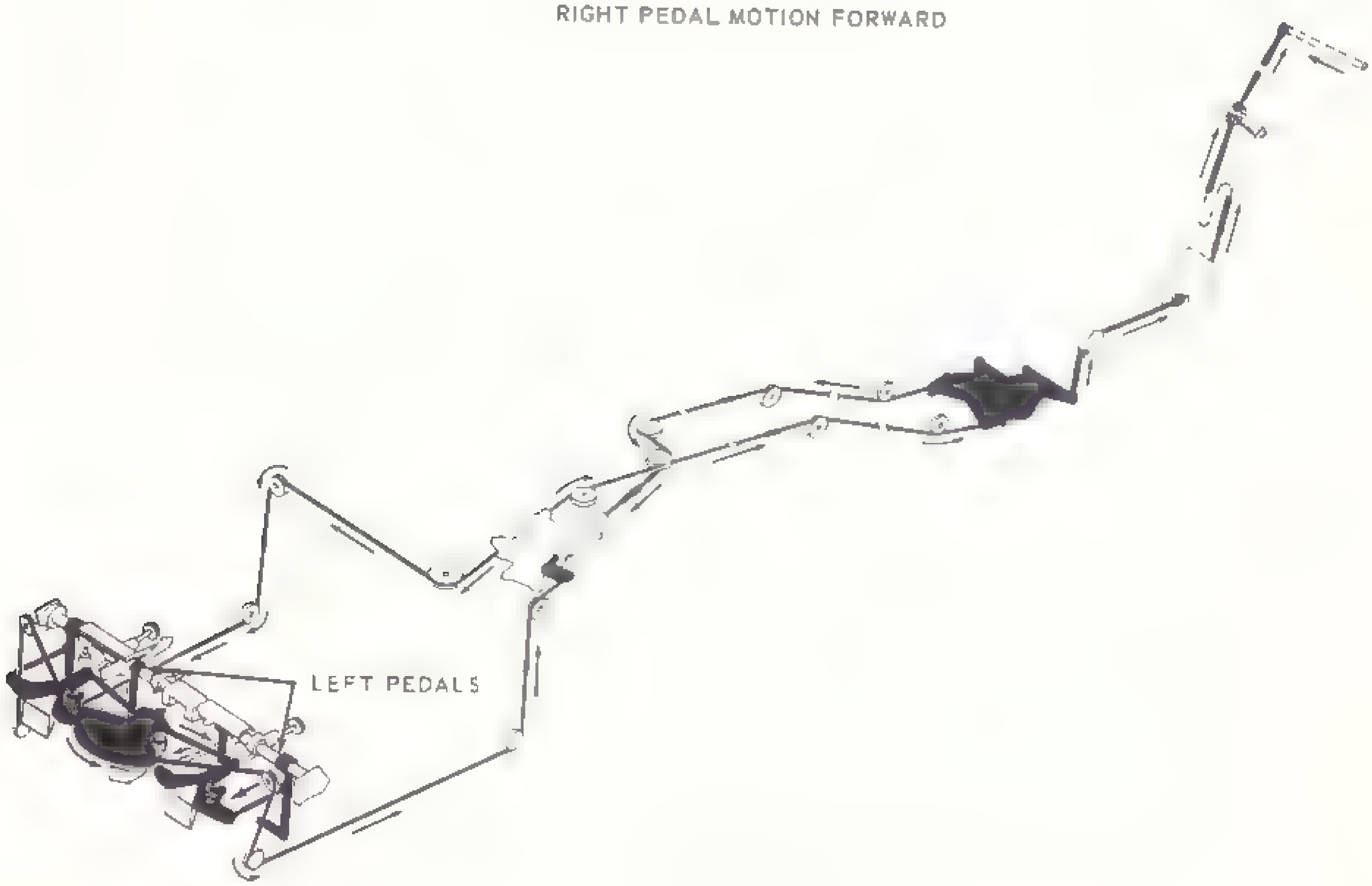


1. Pedals Adjustor Assembly
2. Handle
3. Control Cable
4. Tail Rotor Servo Assembly
5. Control Cable
6. Control Cable
7. Control Rod
8. Bellcrank
9. Bellcrank
10. Control Rod
11. Idler
12. Control Rod
13. Control Rod
14. Idler
15. Control Rod
16. Aft Quadrant
17. Control Cable
18. Control Rod
19. Control Rod
20. Control Rod
21. Pedal Damper Assembly
22. Forward Quadrant
23. Control Pedals and Support Assembly

Figure 9–3. Tail rotor control system (Sheet 1 of 2)

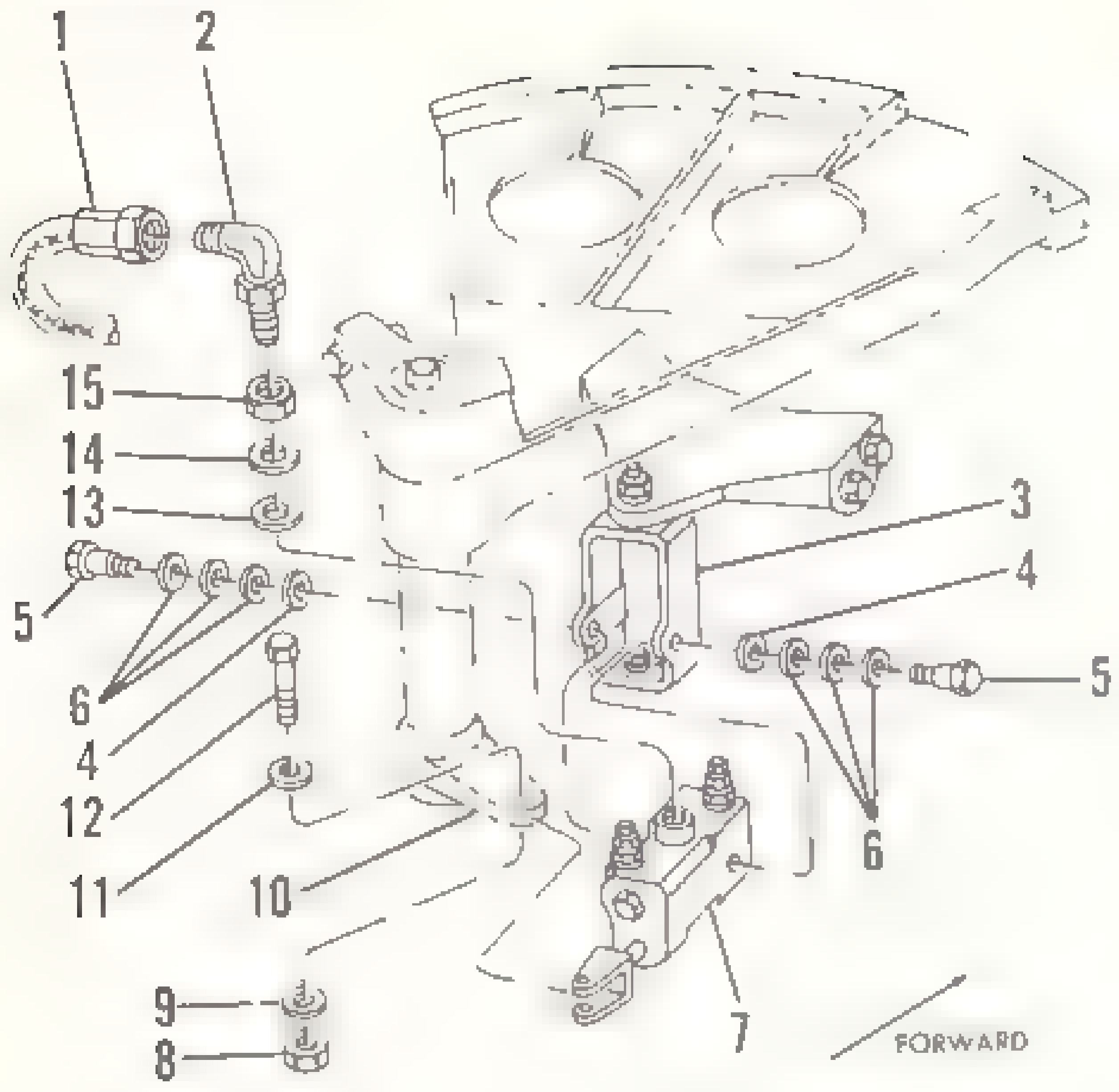


RIGHT PEDAL MOTION FORWARD



LEFT PEDAL MOTION FORWARD

Figure 9—3. Tail rotor control system (Sheet 2 of 2)



1. Hose Assembly
2. Elbow
3. Trunnion Assembly
4. Shim
5. Trunnion
6. Washers
7. Pedal damper assembly
8. Nut
9. Washer
10. Quadrant Arm
11. Washer
12. Bolt
13. Gasket
14. Washer
15. Nut

Figure 9–4. Pedal damper assembly installation

d. Inspection. Inspect pedal damper assembly for cracks, dents, and malformed threads.

e. Installation. (1) Install gasket (13, figure 9–4), washer (14), and elbow (2) in pedal damper assembly (7). Tighten nut (15) to secure elbow in position.

(2) Position pedal damper assembly (7) in trunnion assembly (3) and install shim (4), washers (6), and trunnion (5).

(3) Position fork of pedal damper assembly (7) on quadrant arm (10) and install bolt (12), washers (9 and 11), and nut (8).

(4) Connect hose assembly (1) to elbow (2).

(5) Perform operational check in accordance with step *a* above.

Section III Fixed Flight Controls

Not Applicable

CHAPTER 10
INSTRUMENTS

Section I Scope

10–1. Purpose. The purpose of this chapter is to provide all the essential information for organizational personnel to accomplish maintenance on the complete instruments, as prescribed by the Maintenance Allocation Chart.

10–2. Description. This chapter is divided into flight instruments, navigation instruments, and engine and miscellaneous instruments. The instruments, with the exception of the free-air thermometer, standby compass, and fuel no-transfer warning lights are mounted on the instrument panel. (See figures 10–1 through 10–3.) The instruments provide the pilot and copilot with information as to altitude, heading, and environment of the helicopter, as well as information on operating conditions within various helicopter systems.

10–3. General Troubleshooting. Before any attempt is made at troubleshooting, prime power source should be checked. Reference should be made to the appropriate instrument electrical power system overload protection. Associated circuit breakers should be engaged on dc operated instrument systems. Fuses should be checked and inverters operated to troubleshoot ac operated instruments. Instrument systems including gyros are supplied with single or three phase ac or dc in some cases. Proper prime power must be supplied to instruments before further troubleshooting is attempted. Use of an external power source is recommended for troubleshooting to prevent unnecessary drain on battery. Instrument systems including corresponding indicators on pilot's and copilot's side of instrument panel and a single bulb or pressure transmitter should be observed for operation. Malfunction of one indicator in most cases will not affect the other indicator. Improper readings on both indicators are usually caused by the bulb, pressure transmitter, or power supply. Suspected components can be replaced by others of known quality. Consult appropriate wiring diagrams for location of wiring and disconnect plugs. Visually inspect wiring for insulation wear, breaks, or signs of overheating and inspect disconnect plugs for security. Malfunctions which cause circuit breakers to disengage or fuses to blow can be located by substitution of system components individually, restoring power to circuit after each substitution until faulty component is located. If trouble persists after complete system component substitution, suitable continuity ground and short tests should be performed on system wiring.

10–4. General Instrument Components. The following components provide support or service for various instrument systems and include the instrument range markings, instrument panel, and general instructions for replacement of bezel and clamp mounted instruments.

10–5. Instrument Range Markings. System instruments which indicate proper operating temperature, pressure, and speed ranges which must be maintained to properly and safely operate the helicopter are marked in green. Ranges in which the system may be operated, other than normal, under specified conditions are marked in yellow. Maximum or minimum ranges which must not be exceeded are marked in red. These markings are affixed to the instrument on the outside of the glass face for ready reference by the pilot and copilot during flight. Refer to TM 55-1520-202-10 for proper range markings on instruments.

a. Removal. (1) Use a soft, lint-free cloth dampened in alcohol (item 32, table 1–8) to loosen old adhesive on face of instrument.

(2) Use fingernail or a wood or plastic instrument to remove old range marking from instrument face.

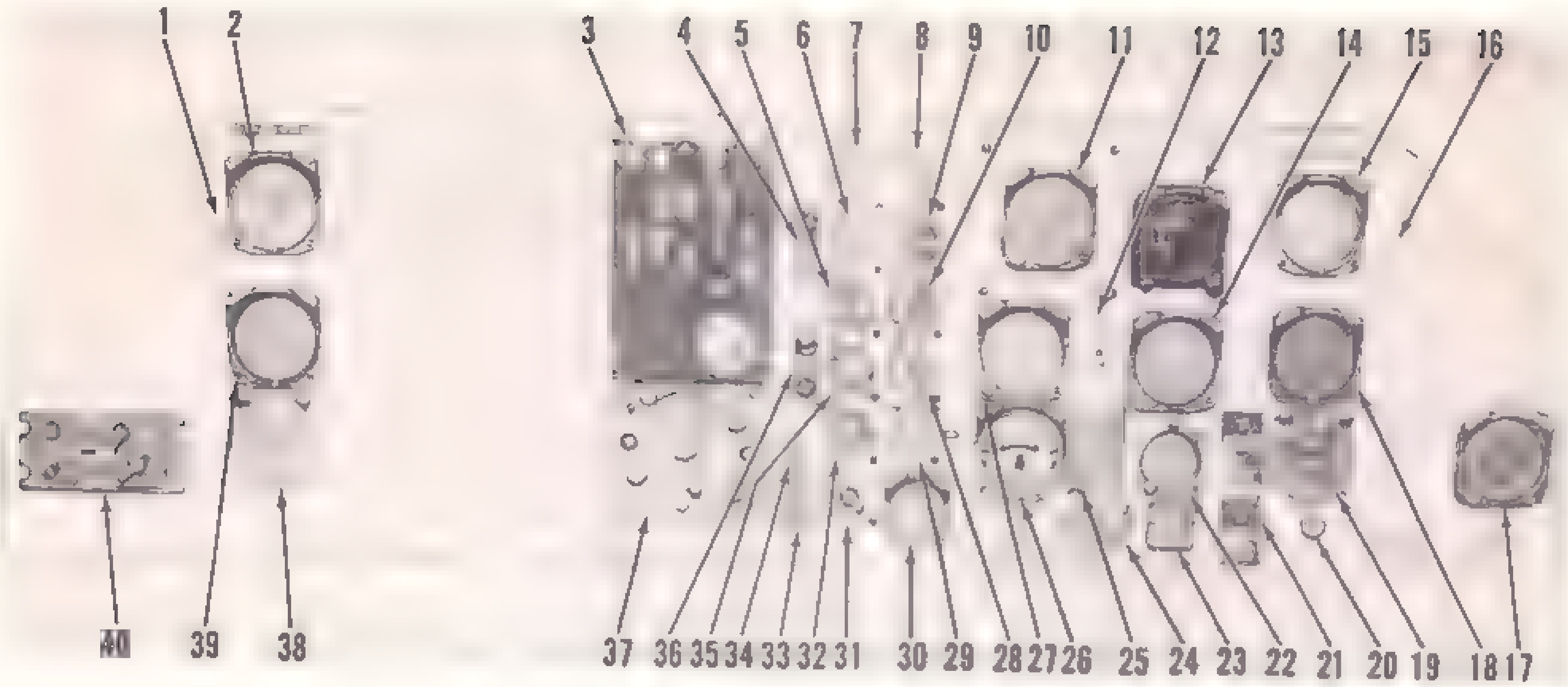
Caution

Do not use metal objects as they may scratch instrument face.

b. Installation. (1) Make sure glass surface to which range marking is to be applied is clean and dry.

(2) Apply new range marking decal in accordance with instructions contained with decal.

10–6. Instrument Panel. (See figure 10–4.) The instrument panel, located in the flight compartment in front of the pilot and copilot, is shock-mounted to absorb both horizontal and vertical forces. Illumination is provided for each of the instruments and switches on the instrument panel, either by a lamp installed on the panel adjacent to the instrument or by two lamps within a light shield attached to the top of the indicator. Access to the mounting screws of the instruments



1. Copilot's Airspeed Correction Card
2. Copilot's Airspeed Indicator
3. Main Switch Panel
4. Fuel Quantity Indicator Test Switch
5. Main Gear Box Oil Temperature Indicator
6. Fuel Quantity Indicator
7. Fuel Pressure Indicator
8. Engine Oil Pressure Indicator
9. Engine Oil Temperature Indicator
10. Cylinder Head Temperature Indicator
11. ***Directional Indicator
12. Compass Slaving Switch
13. Attitude Indicator
14. Vertical Velocity Indicator
15. Pilot's Airspeed Indicator
16. Pilot's Airspeed Correction Card
17. Radio Compass Indicator ID-91/ARN-6
18. Pilot's Dual Tachometer Indicator
19. Pilot's Manifold Pressure Gage
20. Manifold Pressure Gage Purge Valve
21. Checklist Placard
22. Eight-Day Clock
23. Ammeter
24. Marker Beacon Volume Control and Indicator Light
25. Compass Correction Card
26. Turn-and-Slip Indicator
27. Altimeter
28. Carburetor Air Temperature Indicator
29. Auxiliary Hydraulic Pressure Indicator
30. Voltmeter
31. Fuel Quantity Selector Switch
32. Primary Hydraulic Pressure Indicator
33. Transmission Chip Detector Warning Light
34. Engine Chip Detector Warning Light
35. Main Gear Box Oil Pressure Indicator
36. Main Gear Box Oil Pressure Warning Light
37. *ADF Control Unit
38. Copilot's Manifold Pressure Gage
39. Copilot's Dual Tachometer
40. *Interphone Mixing Control Panel

*Space provisions only, Helicopters serial No. 55-4504 and previous

***Helicopters serial No. 55-4462 through 55-4504 and 56-4284 through 56-4342 are equipped with type V-8 indicators. All other helicopters are equipped with V-7A indicators.

Figure 10–1. Instrument panel (helicopters serial No. prior to 56-4343)

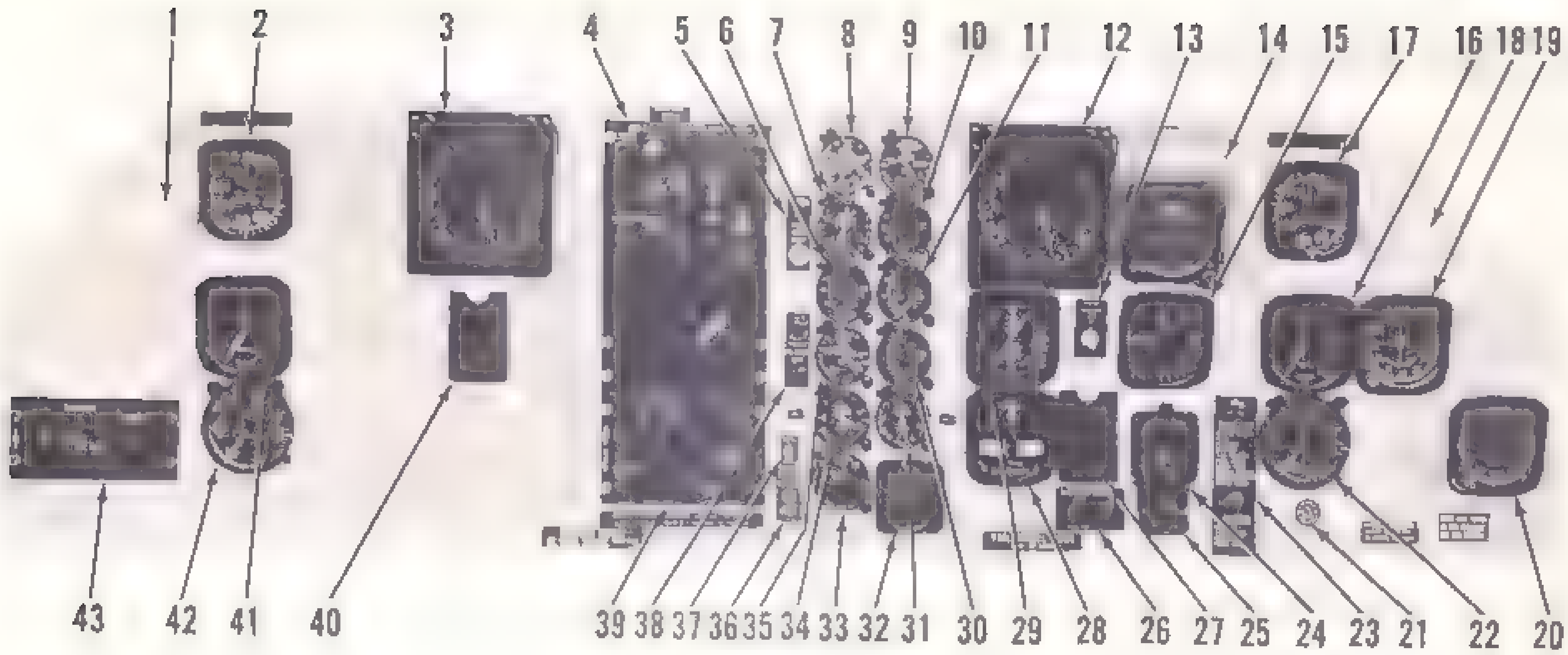
having light shields is gained by hinging down the shield and removing the two bulbs. Illumination of the flight and nonflight instruments can be regulated by two rheostats on the overhead control panel. The rheostats are marked FLIGHT INST LIGHT-OFF-BRT and NONFLIGHT INST LIGHTS-OFF-BRT. The console and panel lights are controlled by another rheostat on the overhead control panel, marked CONSOLE & PANEL LIGHT-OFF-BRT. The instruments have either pressure tubing or electrical wiring connections. A cowl assembly projecting aft above the instruments is secured to the top of the instrument panel by studs and metal fasteners.

a. Removal. (1) Place battery and generator switches in OFF position, and make sure external power source is disconnected.

(2) In electronics compartment, remove disconnect plug from battery. Provide a means to ensure cable will not be reconnected while instrument panel is being serviced.

(3) From sides of cowl assembly (1, figure 10–4), remove studs (2). Remove fasteners (3) and cowl assembly (1).

(4) Tag and remove hose assemblies at fittings on rear of all altimeters, airspeed indicators, vertical velocity indicators, and manifold pressure gages.



1. Copilot's Airspeed Correction Card
2. Copilot's Airspeed Indicator
3. Copilot's V-7A Directional Indicator
4. Main Switch Panel
5. Fuel Quantity Indicator Test Switch
6. Main Gear Box Oil Temperature Indicator
7. Fuel Quantity Indicator
8. Fuel Pressure Indicator
9. Engine Oil Pressure Indicator
10. Engine Oil Temperature Indicator
11. Cylinder Head Temperature Indicator
12. Pilot's V-7A Directional Indicator
13. Compass Slaving Switch
14. Attitude Indicator
15. Vertical Velocity Indicator
16. Pilot's Dual Tachometer Indicator
17. Pilot's Airspeed Indicator
18. Pilot's Airspeed Correction Card
19. Course Indicator ID-453/ARN
20. *Radio Compass Indicator ID-91/ARN-6
    **Azimuth Indicator ID-637/ARN-59
21. Manifold Pressure Gage Purge Valve
22. Pilot's Manifold Pressure Gage
23. Checklist Placard
24. Eight-Day Clock
25. Ammeter
26. Marker Beacon Volume Control and Indicator Light
27. Pilot's Compass Correction Card Holder
28. Turn-and-Slip Indicator
29. Altimeter
30. Carburetor Air Temperature Indicator
31. Auxiliary Hydraulic Pressure Indicator
32. Voltmeter
33. Fuel Quantity Selector Switch
34. Primary Hydraulic Pressure Indicator
35. Main Gear Box Oil Pressure Indicator
36. Transmission Chip Detector Warning Light
37. Engine Chip Detector Warning Light
38. Main Gear Box Oil Pressure Warning Light
39. ADF Control Unit
40. Copilot's Compass Correction Card Holder
41. Copilot's Dual Tachometer Indicator
42. Copilot's Manifold Pressure Gage
43. Signal Distribution Panel

*Helicopters serial No. 57-1685 to 57-1726
**Helicopters serial No. 57-1726 through 57-1741

Figure 10—2. Instrument panel (helicopters serial No. 57-1685 through 57-1741)

Caution

Cover opening on rear of instruments to prevent contamination of interior of instrument after removing hose assemblies.

Note

Airspeed indicators are connected to two hose assemblies.

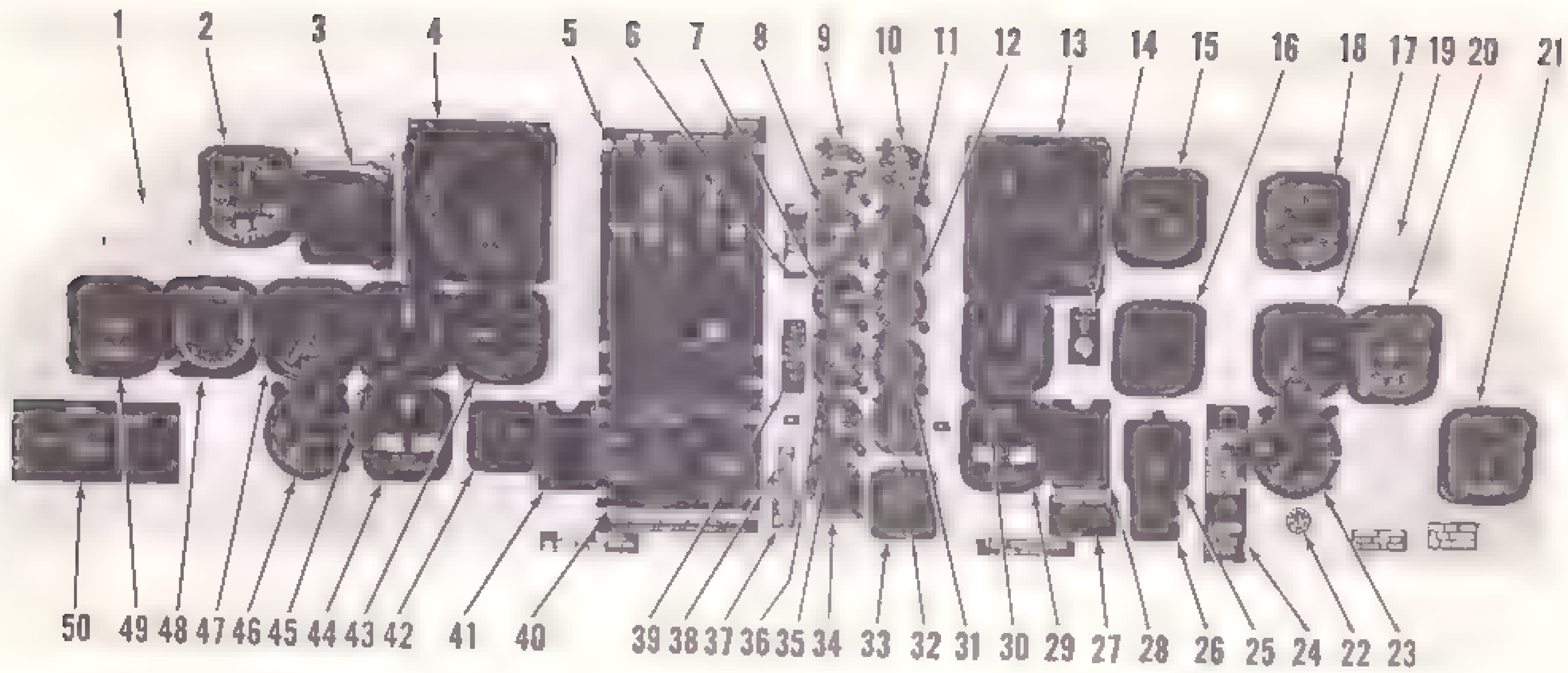
(5) Remove disconnect plugs from rear of radio compass, azimuth, course, cross pointer, and attitude indicators.

(6) Using appropriate wiring diagram for reference, disconnect shielded lead from fuel quantity system at connectors in floor and leads from fuel quantity selector switch at terminal board on rear of instrument panel.

(7) Remove disconnect plugs at rear of ADF control unit and signal distribution panel.

(8) Remove instrument panel disconnect plug located on floor beneath instrument panel.

(9) Inspect rear of instrument panel (10, figure 10—4) carefully for wiring connected, clamped, or



1. Copilot's Airspeed Correction Card
2. Copilot's Airspeed Indicator
3. Copilot's Attitude Indicator
4. Copilots V-7A Directional Indicator
5. Main Switch Panel
6. Fuel Quantity Indicator Test Switch
7. Main Gear Box Oil Temperature Indicator
8. Fuel Quantity Indicator
9. Fuel Pressure Indicator
10. Engine Oil Pressure Indicator
11. Engine Oil Temperature Indicator
12. Cylinder Head Temperature Indicator
13. Pilot's Attitude Indicator
14. Compass Slaving Switch
15. Pilot's V-8 Directional Indicator
16. Pilot's Vertical Velocity Indicator
17. Pilot's Dual Tachometer Indicator
18. Pilot's Airspeed Indicator
19. Pilot's Airspeed Correction Card
20. Course Indicator ID-453/ARN
21. Pilot's Azimuth Indicator ID-637/ARN-59
22. Manifold Pressure Gage Purge Valve
23. Pilot's Manifold Pressure Gage
24. Checklist Placard
25. Pilot's Eight-Day Clock
26. Ammeter
27. Marker Beacon Volume Control and Indicator Light
28. Pilot's Compass Correction Card Holder
29. Pilots Turn-and-Slip Indicator
30. Pilot's Altimeter
31. Carburetor Air Temperature Indicator
32. Auxiliary Hydraulic Pressure Indicator
33. Voltmeter
34. Fuel Quantity Selector Switch
35. Primary Hydraulic Pressure Indicator
36. Main Gear Box Oil Pressure Indicator
37. Transmission Chip Detector Warning Light
38. Engine Chip Detector Warning Light
39. Main Gear Box Oil Pressure Warning Light
40. ADF Control Unit
41. Copilot's Compass Correction Card Holder
42. Copilot's Eight-Day Clock
43. Copilot's Vertical Velocity Indicator
44. Copilot's Turn-and-Slip Indicator
45. Copilot's Altimeter
46. Copilot's Manifold Pressure Gage
47. Copilot's Duel Tachometer Indicator
48. Copilot's Azimuth Indicator ID-637/ARN
49. Cross Pointer Indicator (ID-48/ARN)
50. Signal Distribution Panel

Figure 10–3. Instrument panel (model CH-34C)

laced to instrument panel not routed through instrument panel disconnect plug. Tag and remove.

(10) Provide a suitable means of support for upper portion of instrument panel and remove upper shock mount assemblies (7), nuts (4), washers (5), and bolts (6).

Caution

Instrument panel must be prevented from tipping fore or aft to prevent damage to instruments, panel, or lower shock mounts.

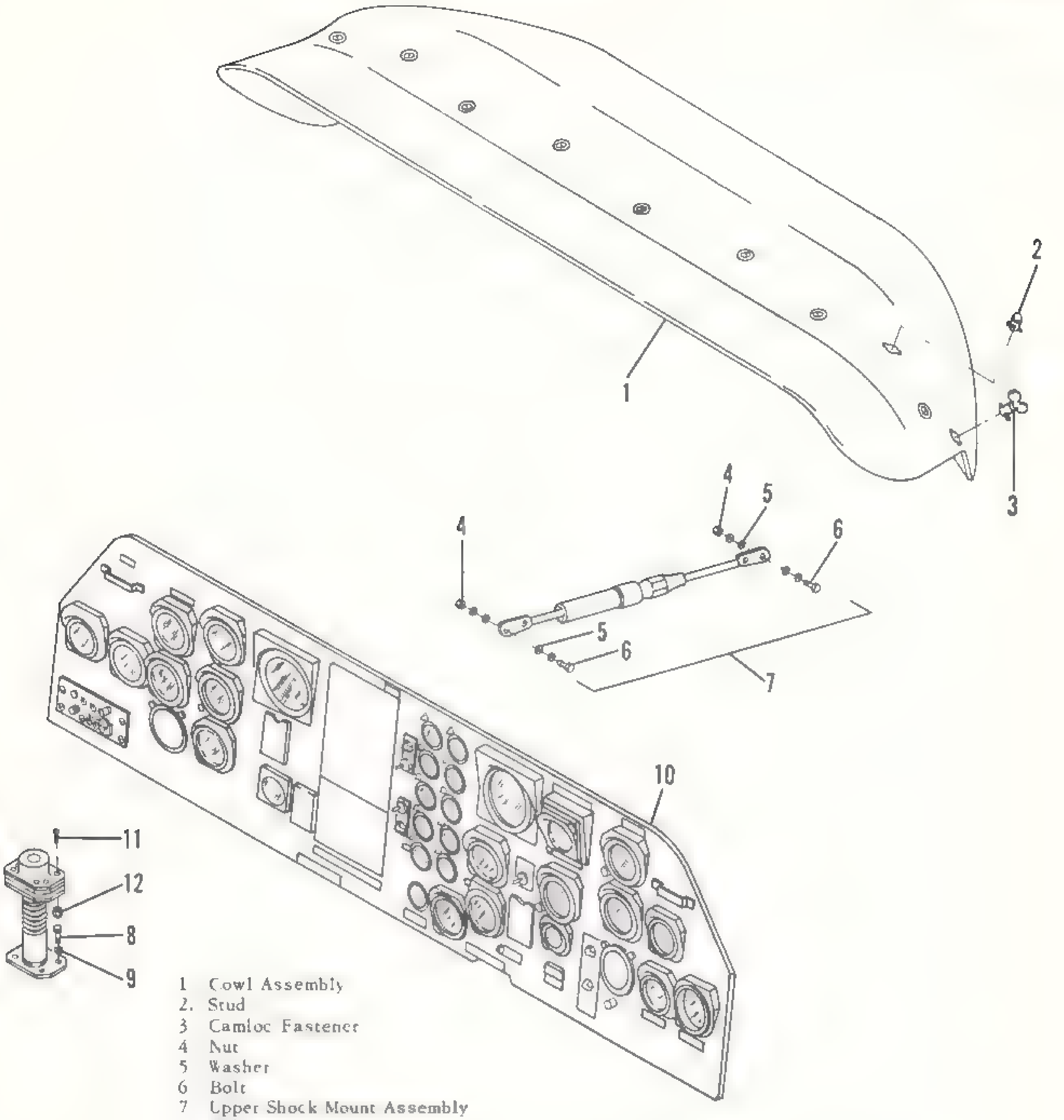
(11) Support instrument panel (10) at bottom and remove bolts (8) and washers (9) securing lower shock mounts to compartment floor. Remove bolts (11) and nuts (12) securing lower shock mounts to pedal support assembly.

(12) Remove instrument panel (10) from flight compartment through one of the sliding windows and secure to work table or employ other suitable means of upright support for instrument panel.

Caution

Handle instrument panel carefully during removal to avoid damage to instruments.

b. Inspection. (1) Inspect instrument panel for peeling paint and elongated mounting holes.



1 Cowl Assembly
2. Stud
3 Camloc Fastener
4 Nut
5 Washer
6 Bolt
7 Upper Shock Mount Assembly
8 Bolt
9 Washer
10 Instrument Panel
11. Bolt
12 Nut

Figure 10–4. Typical instrument panel installation

(2) Inspect metal fasteners for unserviceable conditions.

(3) Inspect shock mounts for resiliency.

(4) Inspect mounting hardware for scoring, malformed threads, and corrosion.

c. Installation. (1) Inspect rear of instrument panel (10, figure 10—4) for damaged wiring, disconnect plug, tubing, and clamps. Inspect clamps and other mounting hardware for security.

(2) Place instrument panel (10) in flight compartment through side window, position lower shock mount assemblies in proper position, and secure with bolts (8) and washers (9). Install instrument panel on lower shock mounts and secure with bolts (11) and nuts (12).

Caution

Handle instrument panel carefully during installation to avoid damage to instruments.

(3) Install upper shock mount assemblies and secure with bolts (6), washers (5), and nuts (4).

(4) Install any wiring removed in step *a*(9) above.

(5) Install instrument panel disconnect plug in receptacle in pilot's compartment floor beneath instrument panel.

(6) Using proper wiring diagrams for reference, install disconnect plugs at rear of ADF control unit and signal distribution panel. Secure plugs with lock wire.

(7) Install disconnect plugs and secure with lock wire to rear of altitude, cross pointer, course, azimuth, and radio compass indicators.

(8) Using appropriate wiring diagram for reference, install shielded lead from fuel quantity system to connectors in floor and connect leads to fuel quantity selector switch to terminal board on rear of instrument panel.

(9) Using tags installed in *a*(4) above, as a guide, remove covers, install, and secure proper hose assemblies to connectors on manifold pressure gage, vertical velocity and airspeed indicators, and altimeter.

Note

Airspeed indicators are connected to two hose assemblies.

(10) Install instrument panel disconnect plug.

(11) Install cowl assembly (1, figure 10—4) with studs (2). Secure fasteners (3).

(12) In electronics compartment, install disconnect plug to battery.

(13) Inspect instrument panel shock mounts for proper installation. Move instrument panel vertically and laterally to see that shock mounts are operating freely and properly.

10—7. Bezel Mounted Indicators. Bezel mounted indicators (figure 10—5) are mounted from the front of the instrument panel and held by a flange or bezel. Four screws, located at the corners of the bezel, are used to secure the indicator to the instrument panel.

a. Removal. (1) Place battery and generator switches, located on main switch panel, in OFF position and make sure external power source is disconnected. Cage gyro before removing a gyro instrument.

(2) Grasp hinged bulb shield (1, figure 10—5) at corners A and pull outward and downward to position shown at B.

(3) Raise hinged bulbs (2) to gain access to top mounting screws (3). Remove mounting screws (3 and 4).

(4) Remove light fixture (5) and grasp indicator (6) as shown at C, pulling it out of instrument panel far enough to gain access to disconnect plug (7), wiring, or hose connected to rear of indicator.

Caution

Handle indicator carefully to avoid damage to indicator, wiring, or hose. Remove cowl assembly and remove connections at rear of indicator if access cannot be gained from front.

(5) Remove lock wire and remove disconnect plug (7), wiring, or hose from connectors at rear of indicator.

(6) Cover connectors to keep out foreign matter.

b. Installation. (1) Place battery and generator switches, located on main switch panel, in OFF position and make sure external power source is disconnected.

(2) Uncover connectors and install disconnect plug (7, figure 10—5), wiring, or hose to fitting at rear of indicator and lockwire. Install indicator (6) in instrument panel.

(3) Place light fixture (5) in its proper position on indicator (6) as shown at B and install mounting screws (3 and 4).

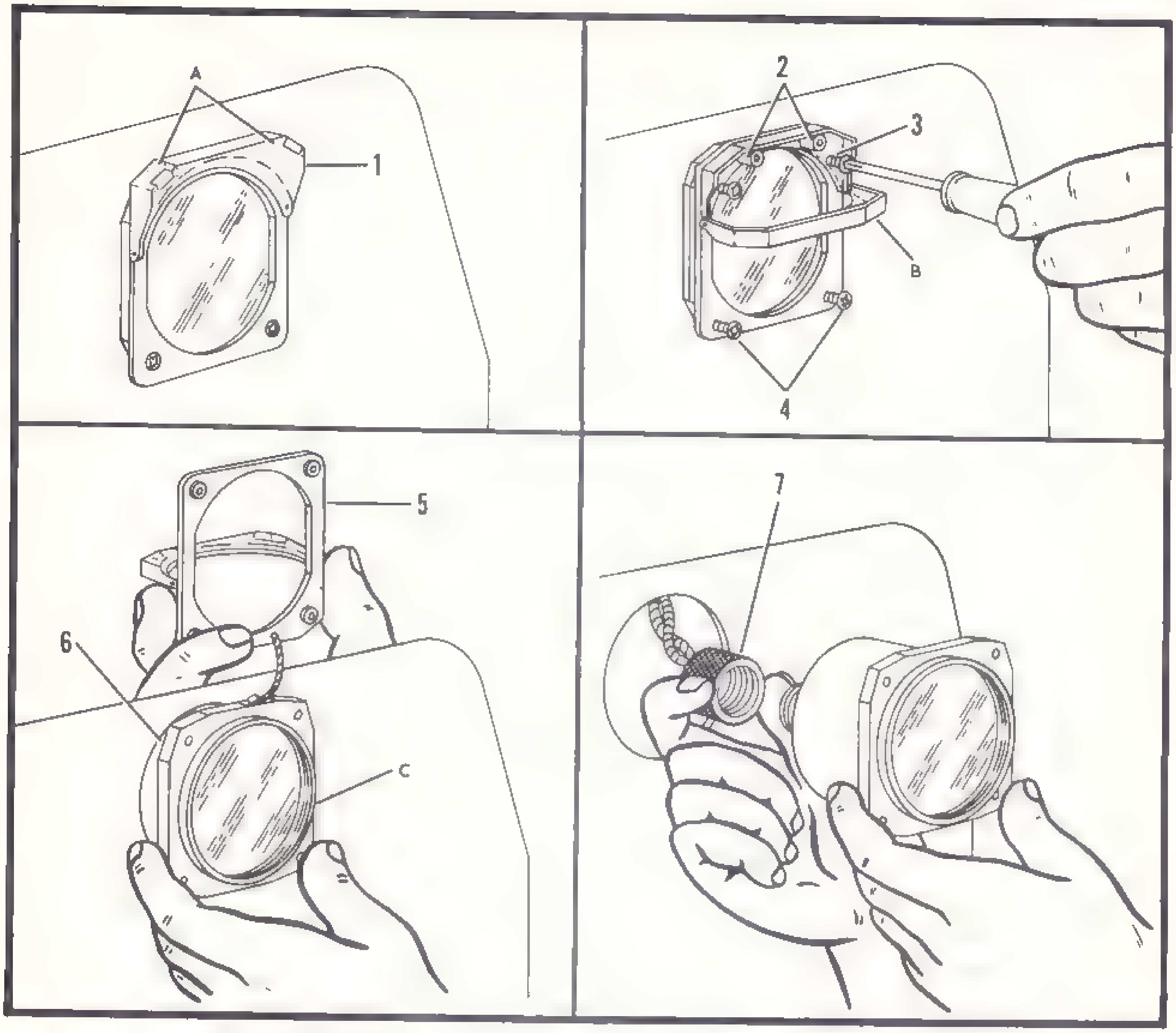
Caution

Make sure all four corners of bezel are flush with instrument panel before tightening screws.

(4) Lower hinged bulbs (2) to their proper positions and grasp hinged bulb shield (1) by its corners (A) and raise it to proper position.

(5) Reinstall cowl assembly if removed.

10—8. Clamp Mounted Indicators. Clamp mounted indicators (figure 10—6) are held in place in the instrument panel by means of a clamp assembly mounted to the back of the instrument panel. The clamp assembly is secured to the instrument panel by a screw located at the upper left of the indicator mounting and a jack-



1. Hinged Bulb Shield
2. Hinged Bulb
3. Mounting Screw
4. Mounting Screws
5. Light Fixture
6. Indicator
7. Disconnect Plug

Figure 10–5. Typical bezel mounted indicator

screw located at the lower right. The jackscrew also actuates the clamp assembly.

a. Removal. (1) Place battery and generator switches, located on main switch panel, in OFF position and make sure external power source is disconnected.

(2) Loosen jackscrew (1, figure 10–6) until indicator (2) can be grasped.

(3) Pull indicator (2) out of instrument panel far enough to expose disconnect plug (3), wiring, or hose connected to rear of indicator.

(4) Remove lock wire and remove disconnect plug (3), wiring, or hose from fittings at rear of indicator.

Caution

Handle indicator carefully to avoid damage to indicator, wiring, or hose. Remove cowl assembly and remove connections at rear of indicator if access cannot be gained from the front.

(5) Cover connectors to keep out foreign matter.

(6) Remove screw (4) and jackscrew (1) to remove clamp assembly (5) from instrument panel.

Note

It is not necessary to remove clamp assembly unless inspection proves it defective.

Section II Flight Instruments

10–9. Description. The flight instruments provide the pilot and copilot with information necessary to maintain the correct flight attitude of the helicopter. The flight instruments include the altimeters, airspeed indicators, vertical velocity indicators, and associated pitot and static systems. Also included in the flight instruments are the turn-and-slip indicators, attitude indicators, and free-air thermometer.

10–10. Altimeters. The altimeters (figures 10–1 through 10–3) located on the instrument panel indicate the altitude of the helicopter in feet above sea level under standard conditions of atmospheric pressure and temperature. The range of the altimeters is 0 to 50,000 feet. Three pointers arranged concentrically indicate altitude in increments of 100, 1000, and 10,000 feet. A small scale, calibrated in inches of mercury, shown through a cut-out in the dial face is used in adjusting the altimeter to variations in atmospheric pressure. The altimeter consists of an evacuated diaphragm and a mechanism for amplifying the motion of diaphragm deflection. The instrument case is airtight, and a single outlet connects by tubing to the static port. A change in altitude is accompanied by a corresponding change in atmospheric pressure. This results in a compression or expansion of the diaphragm proportional to the change in atmospheric pressure. A link from the diaphragm transmits the motion to the calibration train connected to the pointer handstaff. A hairspring, fastened at one end to a member of the gear train and to the mechanism body at the other end, removes the backlash from the mechanism.

10–11. Troubleshooting. For troubleshooting procedures for the altimeters, proceed as follows:

Caution

The altimeters are connected to the same static lines as the airspeed and vertical velocity indicators. Great care should be exercised, when troubleshooting one of the instruments, not to damage another instrument.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive pointer oscillation	Excessive vibration caused by worn or deteriorated shock mounts	Replace shock mounts. (Refer to paragraph 10–6*a* and *b*.)
	Defective mechanism	Bench test; replace altimeter if necessary. (Refer to paragraph 10–7*a* and *b*.)
Low or high reading	Defective mechanism	Replace altimeter. (Refer to paragraphs 10–7*a* and *b*.)
	Loose pointer	Replace altimeter. (Refer to paragraph 10–7*a* and *b*.)
Setting knob turns excessively hard	Defective altimeter	Replace altimeter. (Refer to paragraph 10–7*a* and *b*.)
Setting knob screw loose or missing	Excessive vibration; careless maintenance.	Tighten screw if loose. Replace altimeter if screw is missing. (Refer to paragraph 10–7*a* and *b*.)
Cracked cover glass	Excessive vibration; careless handling	Replace altimeter. (Refer to paragraph 10–7*a* and *b*.)
Dull or discolored luminous markings	Age	Replace altimeter. (Refer to paragraph 10–7*a* and *b*.)
Barometric scale or reference markers not synchronized with pointers	Slippage in mating	Replace altimeter. (Refer to paragraph 10–7*a* and *b*.)
Pointers fail to respond	Static pressure lines clogged	Disconnect all instruments from static line and blow line clear.
	Static pressure lines temporarily disconnected	Inspect connections and connect where necessary.

10–12. Operational Check. Set barometric pressure dial, with knob at lower left corner of altimeter case, to ambient barometric pressure. Altimeter should indicate airport altitude above sea level.

10–13. Removal. Remove altimeters in accordance with paragraph 10–7*a*.

10–14. Inspection. a. Inspect glass for scoring and cracks.

b. Inspect instrument case for dents and malformed threads.

10–15. Installation. Install altimeters in accordance with paragraph 10–7*b*.

10–16. Airspeed Indicators. The airspeed indicators (figures 10–1 through 10–3) indicate the speed of the helicopter relative to the air through which the helicopter is flying. The indicators, which are mounted on the instrument panel in front of the pilot and copilot, are connected by tubing to both the pitot tube and static ports. Each indicator has a single dial and pointer. The dial has a range of 0 to 150 knots and is divided in increments of 5 knots. The indicator assembly consists primarily of an airtight diaphragm and linkage for multiplying diaphragm deflection. The pitot tube is connected to the interior of the diaphragm and the static tube is connected to the case. As the speed of the helicopter increases, the increased pressure inside the diaphragm causes the diaphragm to expand. Mechanisms on the interior of the airspeed indicators cause the pointer to follow the motion of the diaphragm giving an indication of airspeed in knots. The airspeed correction cards and holder assemblies are located on the left-hand and right-hand side of the instrument panel. The correction card shows the indicated airspeed and the calibrated airspeed. The correction card holder is secured to the instrument panel by two screws.

10–17. Troubleshooting. For troubleshooting procedures for the airspeed indicators, proceed as follows:

Caution

The airspeed indicators are connected to the same static lines as the altimeters and vertical velocity indicators. Care should be exercised, when troubleshooting one of the instruments, not to damage another instrument.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer fails to respond	Pressure line not properly connected; lines clogged with foreign matter	Disconnect all instruments from pitot and static lines, and blow lines clear.
Pointer indicates incorrectly	Leak in lines	Test pitot line. Notify direct support maintenance unit.
	Defective or leaking airspeed indicator	Replace airspeed indicator (Refer to paragraph 10–7*a* and *b*.)
Pointer does not return to 0 when the helicopter is not in motion	Defective indicator	Replace airspeed indicator. (Refer to paragraph 10–7*a* and *b*.)
	Water or dirt in pitot or static lines	Disconnect pitot and static lines from all instruments, and blow out lines.
Pointer vibrates	Defective shock mounts	Replace shock mounts. (Refer to paragraph 10–6*a* and *b*.)
	Excessive vibration of lines	Fasten tubing firmly in place.
	Defective airspeed indicator	Replace airspeed indicator. (Refer to paragraph 10–7*a* and *b*.)
Pointer oscillates	Leak in pitot line	Tighten fittings. Notify direct support maintenance unit.
	Leaky bellows	Replace airspeed indicator. (Refer to paragraph 10–7*a* and *b*.)

10–18. Removal. Remove airspeed indicator in accordance with paragraph 10–7*a*.

10–19. Inspection. a. Inspect glass for scoring and cracks.

b. Inspect case for dents and malformed threads.

10–20. Installation. Install airspeed indicator in accordance with paragraph 10–7*b*.

10–21. Vertical Velocity Indicators. The vertical velocity indicators (figures 10–1 through 10–3) located on the instrument panel, indicate the rate of

ascent or descent in feet per minute up to 6000 feet per minute. The pointer moves clockwise when indicating ascent and counterclockwise when indicating descent. The vertical velocity indicator incorporates two air-enclosing chambers, a pressure-sensitive diaphragm vented directly to the static line, and the airtight case of the instrument vented to the static line through a thin-walled porcelain capillary tube. Changes in pressure resulting from changes in altitude are transmitted quickly to the inside of the diaphragm and slowly through the capillary tube to the inside of the case. This results in a pressure differential causing the diaphragm to expand or contract according to the rate of change of altitude. The motion of the diaphragm is transmitted to the pointer. When the helicopter assumes a fixed altitude, the pressures in the diaphragm and in the case rapidly equalize and the pointer returns to 0. An adjusting screw, located in the lower left corner, is provided for adjusting the 0 indication.

10–22. Troubleshooting. For troubleshooting procedures for the vertical velocity indicators, proceed as follows:

Caution

The vertical velocity indicators are connected to the same static lines as the altimeters and airspeed indicators. Great care should be exercised, when troubleshooting one of the instruments, not to damage another instrument.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer off 0	Mechanism shaft	Return pointer to 0 with adjusting screw.
	Deteriorated diaphragm	Replace vertical velocity indicator. (Refer to paragraph 10–7*a* and *b*.)
Pointer off 0 and cannot be brought back with adjusting screw	Broken pivot	Replace vertical velocity indicator. (Refer to paragraph 10–7*a* and *b*.)
	Defective vertical velocity indicator	Replace vertical velocity indicator. (Refer to paragraph 10–7*a* and *b*)
Pointer fails to respond	Obstruction in static line	Disconnect all instruments from static line, and blow line clear.
Instrument indicates less than actual vertical velocity	Leak in static line	Tighten fittings on tubing.
	Defective vertical velocity indicator	Replace vertical velocity indicator. (Refer to paragraph 10–7*a* and *b*.)
Friction		Replace vertical velocity indicator. (Refer to paragraph 10–7*a* and *b*.)
Pointer oscillates	Leak in static line	Tighten fittings on static tubing.
	Defective vertical velocity indicator	Replace vertical velocity indicator. (Refer to paragraph 10–7*a* and *b*.)

10–23. Removal. Remove vertical velocity indicator in accordance with paragraph 10–7*a*.

10–24. Inspection. a. Inspect glass for scoring and cracks.

b. Inspect case for dents and malformed threads.

10–25. Installation. Install vertical velocity indicator in accordance with paragraph 10–7*b*.

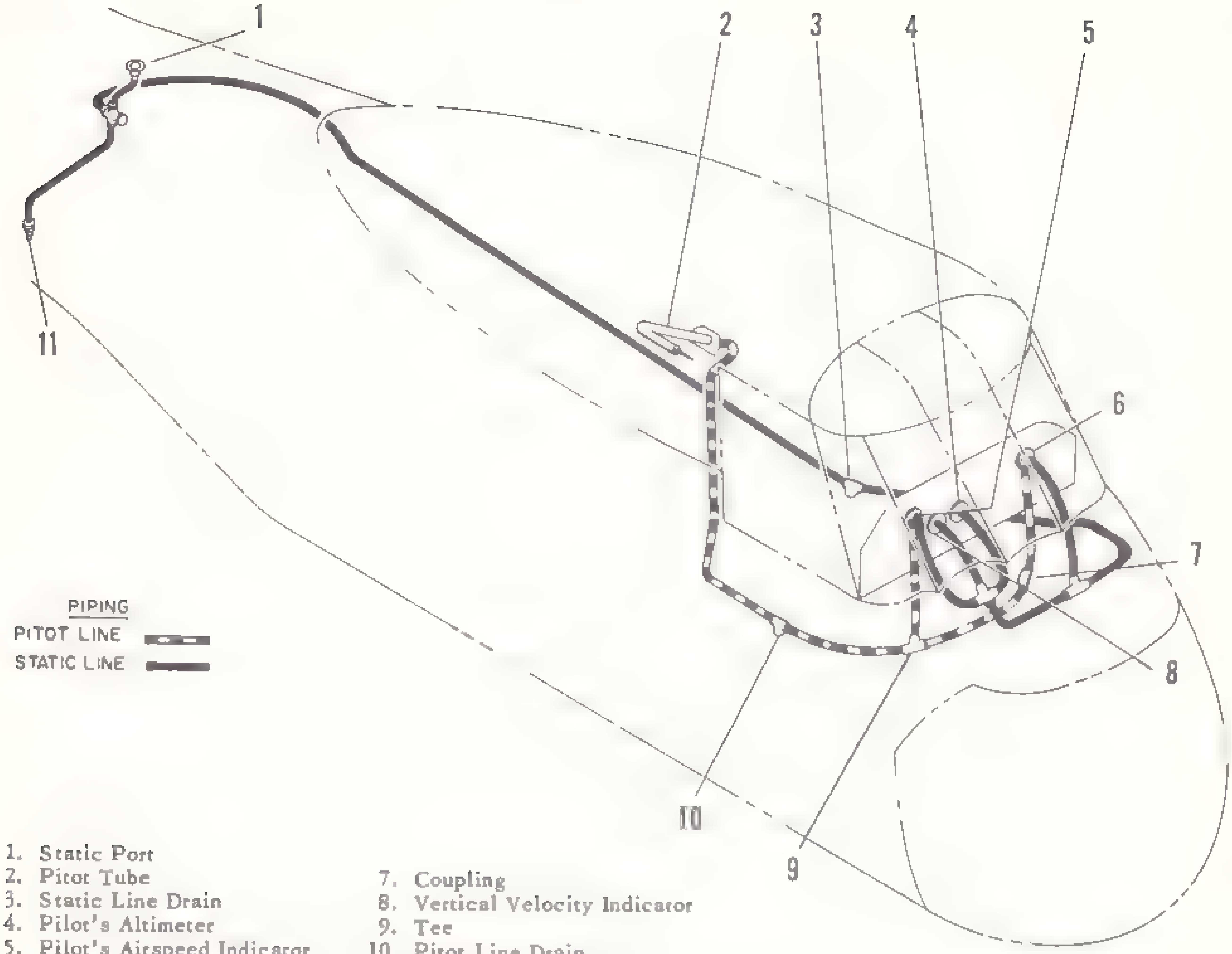
Caution

Do not apply pressure or vacuum to pitot system without first disconnecting airspeed indicators.

10–26. Static Pressure System. (See figures 10–7 and 10–8.) The static pressure system consists of a static pressure port, tubing, and hose extending from the connection to the barometric altimeter, airspeed indicator, and vertical velocity indicator. The static pressure port (1, figures 10–7 and 10–8) consists of a group of seven holes in the skin which open into a threaded flange and gasket riveted to the inner surface of the skin. The static port is located on top of the helicopter above the electronics compartment.

10–27. Cleaning. a. Drain off any moisture accumulated in the pitot system daily by removing cover from pitot line drain (10, figure 10–7 or 12, figure 10–8) at the forward cabin bulkhead on the right side. Replace cover and tighten securely to ensure an airtight fit. Make sure drain holes in pitot tube (2, figures 10–7 or 10–8) are free of dirt.

b. Daily drain off the moisture which collects in the static system at the static port drain (11, figure 10–7 or 13, figure 10–8) mounted on the right side of the electronics compartment aft bulkhead and the static line



1. Static Port
2. Pitot Tube
3. Static Line Drain
4. Pilot's Altimeter
5. Pilot's Airspeed Indicator
6. Copilot's Airspeed Indicator
7. Coupling
8. Vertical Velocity Indicator
9. Tee
10. Pitot Line Drain
11. Static Port Drain

Figure 10–7. Pitot and static system (model CH-34A)

drain (3, figure 10–7 or 10–8) on the left side of the cabin forward bulkhead.

Caution

Do not blow or suck on any static line unless it is disconnected from the instruments.

10–28. Inspection. a. Inspect pitot tube for damage and for entry of foreign matter.

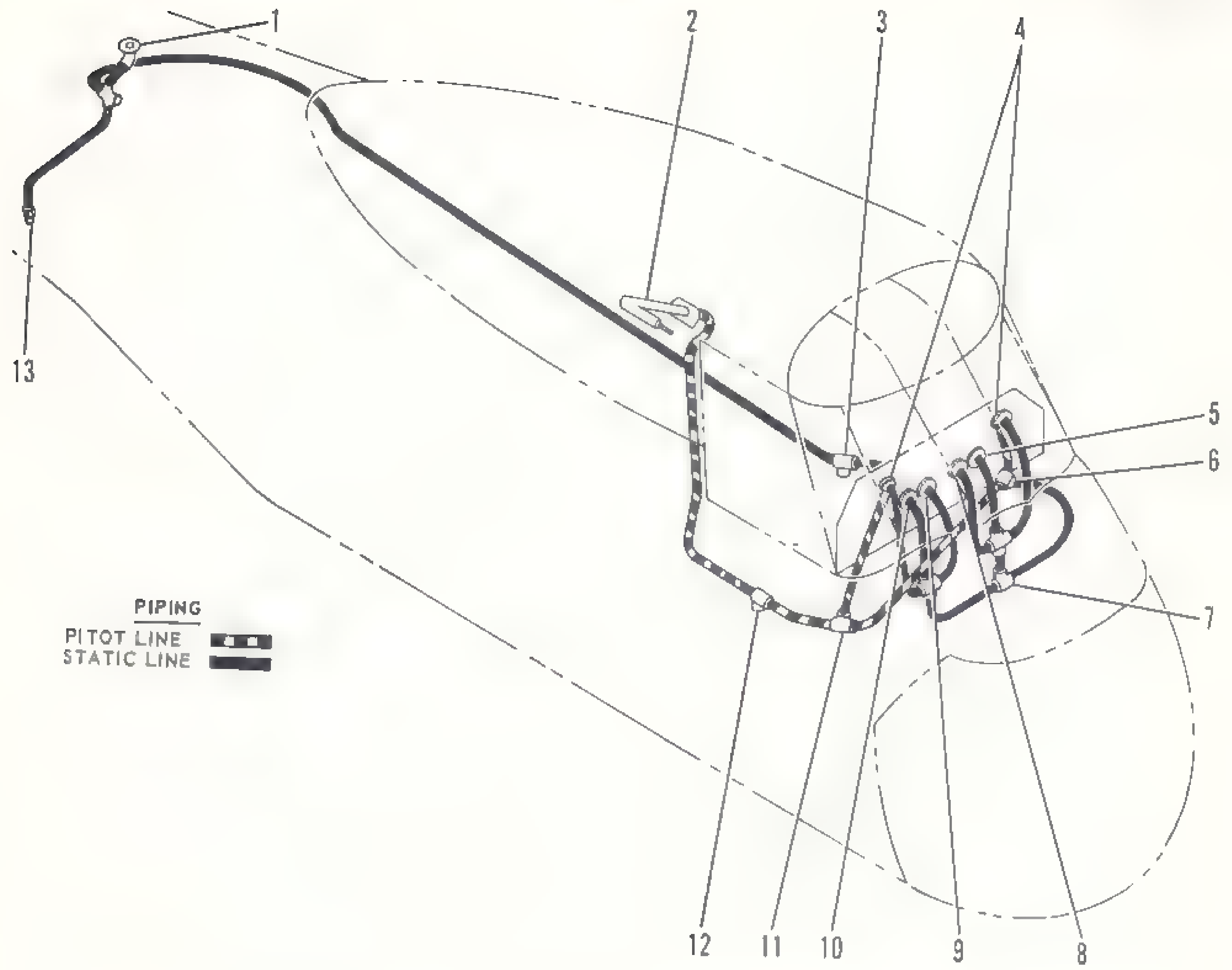
b. Ensure that static openings are free of foreign matter.

c. Inspect pitot and static drains for security of drain plugs.

d. Inspect pitot and static lines for dents, kinks, and other damage.

10–29. Turn-and-Slip Indicators. Model CH-34 series helicopters are equipped with a turn-and-slip indicator (2, figure 10–9), located on the pilot's side of the instrument panel. Model CH-34C helicopters have an additional turn-and-slip indicator (3) mounted on the copilot's side of the instrument panel. The turn indicator is a rate instrument consisting of an electrically driven gyro linked to a pointer. The pointer indicates the direction and the rate of turn. The gyro is powered by 28 volts dc through circuit breakers (1) on the overhead control panel marked TURN & BANK. The slip indicator is a ball-type inclinometer consisting of a curved glass tube filled with damping fluid and containing a glass ball. The ball moves according to the forces acting upon it. During a turn, a skid is indicated when the ball moves from the tube center position opposite that indicated by the turn pointer. A slip is indicated when both the ball and the turn pointer are on the same side. During a coordinated turn, both forces are equal; therefore, the ball will be centered in the tube.

10–30. Troubleshooting. For troubleshooting procedures for the turn and slip indicators, proceed as follows:



1. Static Port
2. Pitot Tube
3. Static Line Drain
4. Airspeed Indicator
5. Copilot's Altimeter
6. Coupling
7. Tee
8. Copilot's Vertical Velocity Indicator
9. Pilot's Altimeter
10. Pilot's Vertical Velocity Indicator
11. Tee
12. Pitot Line Drain
13. Static Port Drain

Figure 10—8. Pitot and static system (model CH-34C)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Gyro does not operate	Poor electrical connections	Check plug and external wiring for loose connections.
	Worn brushes	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Low input voltage because of battery	Check and replace discharged battery.
	Insufficient tension on brush springs	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Intermittent gyro operation	Poor electrical connections	Check plug and external wiring for loose or broken connections.
	Worn brushes	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Intermittent contact in housing	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Insufficient tension on brush springs	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
Radio interference	Poor electrical connections	Check plug and external wiring.
	Dirty or rough connections	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Worn or pitted contacts	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Filter defective	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
Hand fails to respond	Hand touches glass	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Damper springs have slipped from post	Replace turn and slip indicator. (Refer to paragraphs 10–7*a* and *b*.)
	Dirt in armature bearings	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Dirt in damping cylinder	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
Vibrating pointer	Defective instrument panel shock mounts	Replace instrument panel shock mounts. (Refer to paragraph 10–6*a* and *b*.) If vibration cannot be eliminated by replacement of worn or deteriorated shock mountings, replace turn and slip indicator. (Refer to paragraphs 10–7*a* and *b*.)
	Damper springs out of adjustment	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
Sluggish deflection of hand at low temperature	Grease in bearings becomes too thick	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Insufficient clearance of housing bearings	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
Incorrect sensitivity	Maladjustment of centralizing spring and damping cylinder	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)
	Damper springs have slipped from post	Replace turn and slip indicator. (Refer to paragraph 10–7*a* and *b*.)

10–31. Removal. Remove turn-and-slip indicators in accordance with paragraph 10–7*a*.

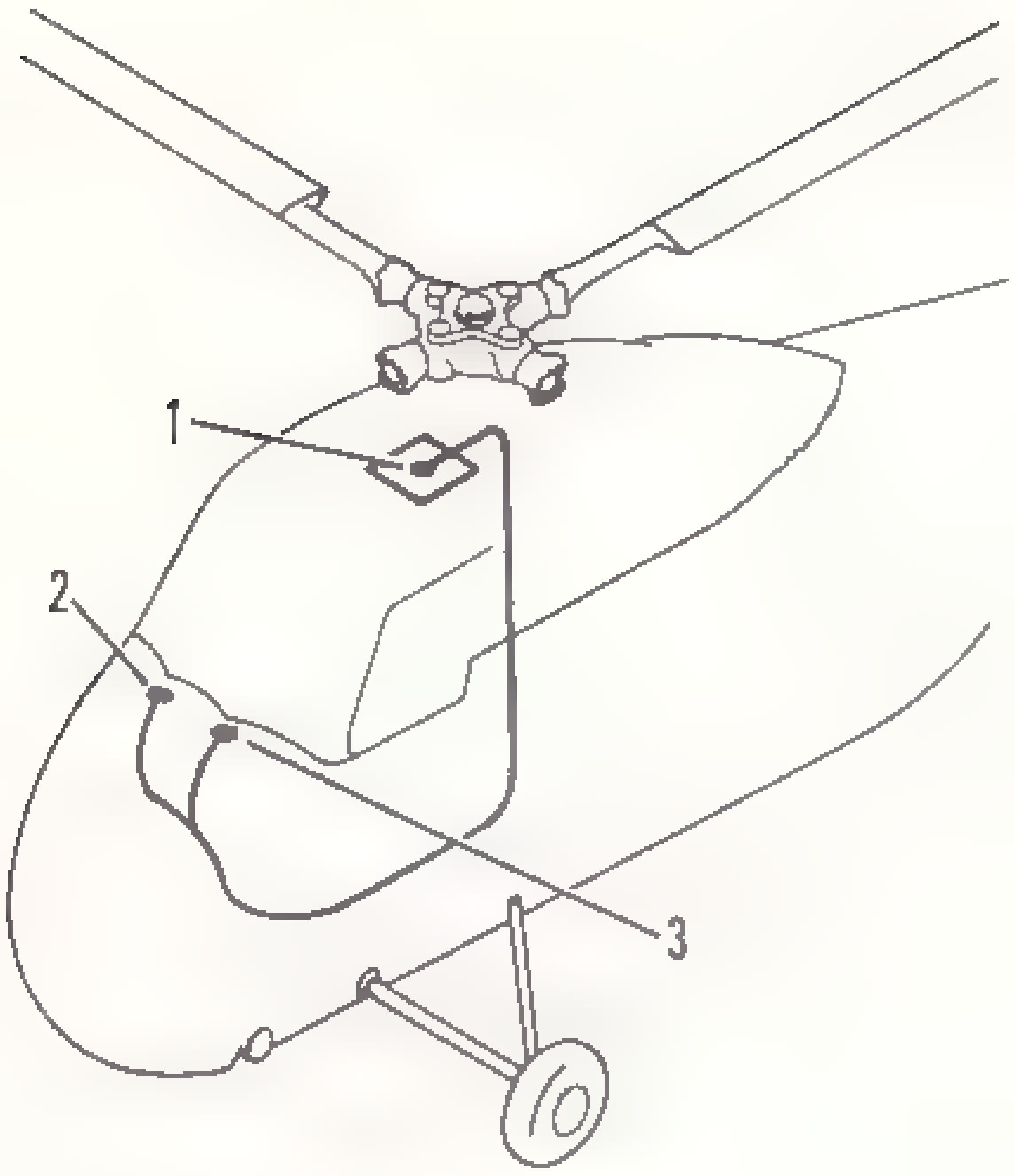
10–32. Inspection. a. Inspect glass for scoring and cracks.

b. Inspect case for dents and malformed threads.

10–33. Installation. Install turn-and-slip indicators in accordance with paragraph 10–7*b*.

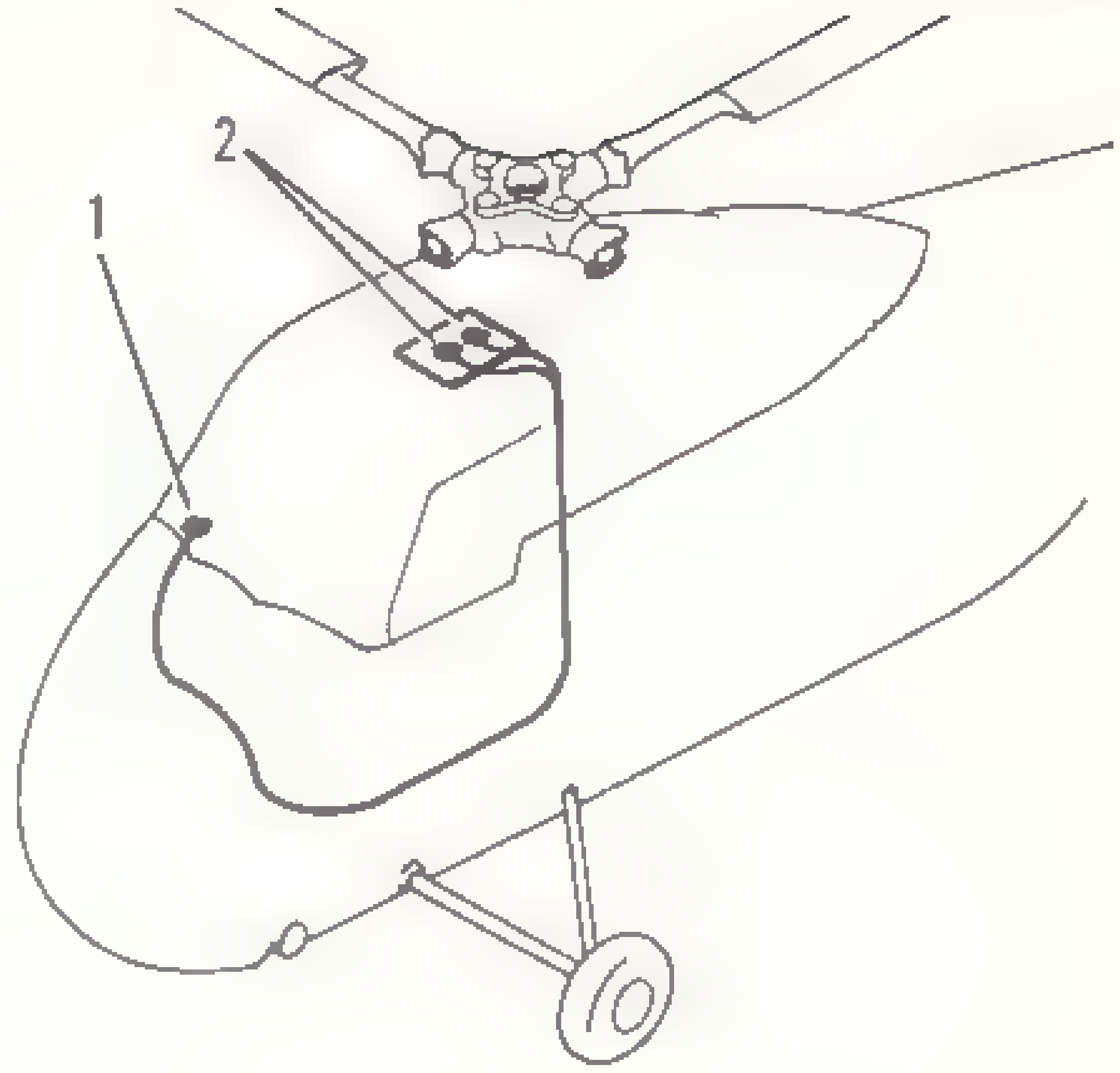
10–34. Attitude Indicator (Model CH-34A).

The attitude indicator (1, figure 10–10), mounted on the instrument panel, provides the pilot or copilot with a constant visual indication of the attitude of the helicopter relative to the earth. The position of a miniature aircraft with respect to a horizon bar indicates the attitude of the helicopter in both pitch and roll. Closing the battery switch prior to starting the engines will start the gyro. Ten minutes should be allowed for the gyro to come up to operating speed and settle before using the indications of the instruments. Three-phase, 115-volt ac power is supplied by the inverters through fuses (2) on the overhead control panel marked GYRO HORIZ. A flag alarm marked OFF appears immediately 2 minutes after power is applied. The gyro is caged by a centering device when the PULL TO CAGE knob at the lower right corner of the instrument is



1. Circuit Breaker
2. Turn-and-Slip Indicator
3. Turn-and-Slip Indicator (Model CH-34C)

Figure 10–9. Turn and slip indicator installation



1. Attitude Indicator
2. Fuses

Figure 10–10. Attitude indicator installation (model CH-34A)

drawn away from the case. The position of the miniature aircraft on the instrument face may be adjusted in height with respect to the horizon bar to compensate for variations of flight attitude in level flight.

Caution

The PULL TO CAGE knob should be drawn out smoothly. A violent or hard pull may damage the instrument.

Note

For all maintenance functions of the attitude indicator system B-1A, refer to Maintenance Allocation Chart in TM 11-1520-202-20P.

10–35. Troubleshooting. For troubleshooting procedures for the attitude indicator, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Gyro does not operate	Poor electrical connections	Check plug and external wiring for loose connections
	Phase A or phase C voltage missing	Check fuses, battery, and inverter.
Intermittent gyro operation	Poor electrical connections	Check plug and external wiring for breaks and loose connections.
	Intermittent contact in housing	Replace attitude indicator. (Refer to paragraph 10–7*a* and *b*.)
Radio interference	Poor electrical connections	Check plug and external wiring for loose connections and correct.
	Intermittent contact in housing	Replace attitude indicator. (Refer to paragraph 10–7*a* and *b*.)
Gyro does not respond readily to changes in attitude	Contact with front glass or binding in mounting	Replace attitude indicator. (Refer to paragraph 10–7*a* and *b*.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Vibration	Instrument panel vibrating	Replace instrument panel shock mounts. (Refer to paragraph 10–6*a* and *b*.)
	Improper damping in attitude indicator	Replace attitude indicator. (Refer to paragraph 10–7*a* and *b*.)

10–36. Removal. a. Cage gyro by operating PULL TO CAGE knob slowly.

b. Remove attitude indicator in accordance with paragraph 10–7*a*.

Warning

Operation of this equipment involves voltages which are dangerous to life.

Note

If one or more shims are installed under bezel of the attitude indicator, note their position and number.

10–37. Inspection. a. Inspect glass for scoring and cracks.

b. Inspect instrument case for dents and malformed threads.

10–38. Installation. Install attitude indicator, in accordance with paragraph 10–7*b*.

Warning

Operation of this equipment involves voltages which are dangerous to life.

Note

If shims were removed from beneath bezel of attitude indicator during removal, reinstall them in the same position from which they were removed.

10–39. Free-Air Thermometer. (See figure 10–11.) The free-air thermometer is located on the center panel of the windshield and is a direct-reading, bimetallic thermometer indicating outside temperature in degrees centigrade. Range markings on the face of the thermometer are from -70 C to 50 C (-94 F to 122 F) in increments of 2 C.

10–40. Removal. a. From outside of helicopter, remove sunshade and nut assembly from stem of thermometer. Remove case washer from stem.

b. From flight compartment, pull instrument and reinforcement plate from grommet in windshield.

c. Remove grommet from windshield.

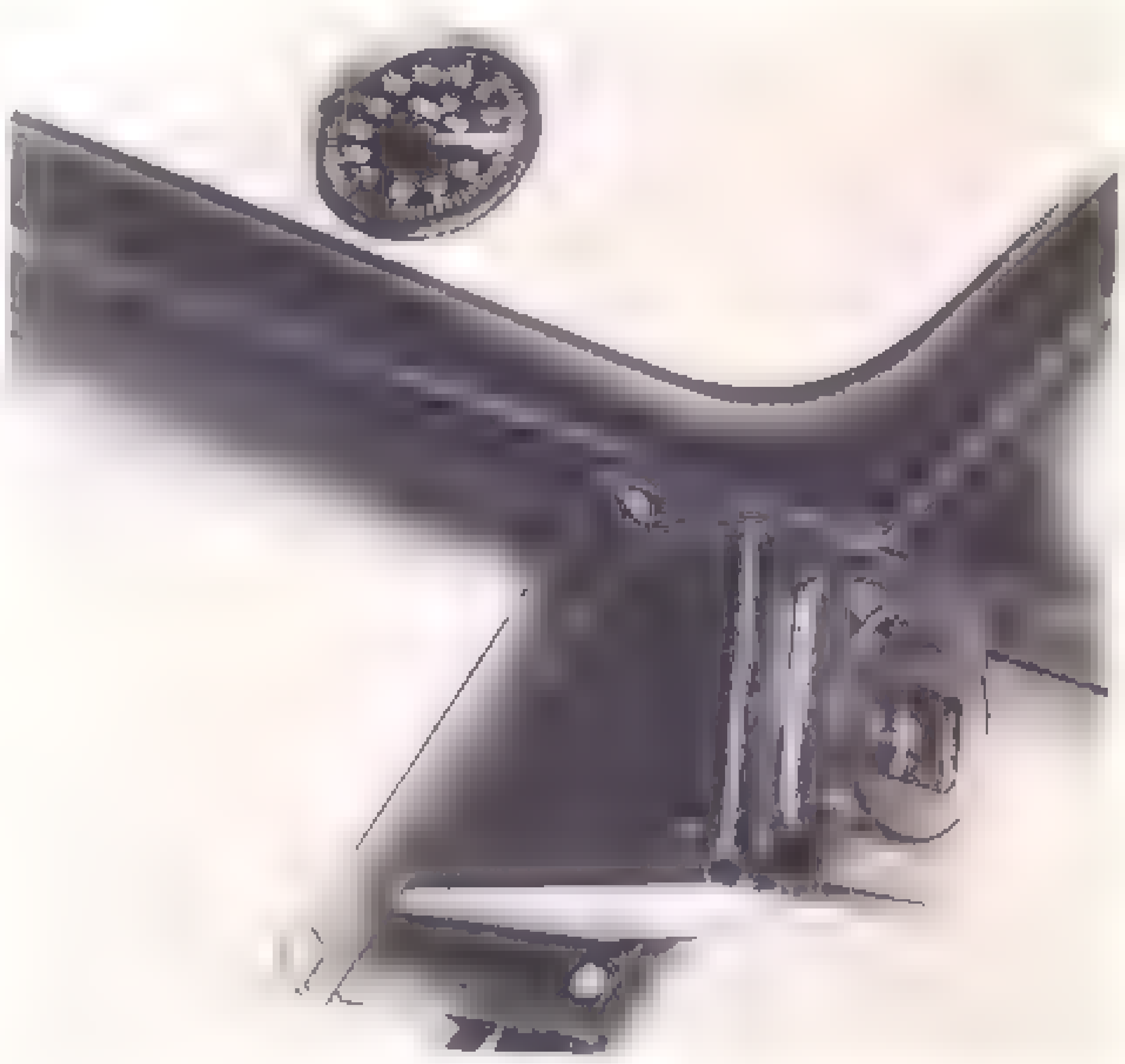


Figure 10–11. Free-air thermometer and standby compass installation

10–41. Inspection. a. Inspect glass for scoring and cracks.

b. Inspect sunshade and nut for dents and malformed threads.

c. Inspect washers and reinforcement plates for corrosion and distortion.

d. Inspect grommet for tears, breaks, and resiliency.

10–42. Installation. a. From flight compartment, install grommet in hole in windshield.

b. Install thermometer stem through grommet and press thermometer and reinforcement plate tightly against grommet.

c. From outside helicopter, install case washer and sunshade.

d. Install nut assembly and tighten.

Note

Orient thermometer and sunshade before tightening nut assembly.

Section III Navigation Instruments

10—43. Description. The navigation instruments provide indications of helicopter heading and course for purposes of dead reckoning. Included in the navigation instruments are the standby compass and eight-day clocks.

10—44. Standby Compass. (See figure 10—11.) The standby compass is located on a bracket mounted to the frame of the center panel of the windshield at the top. A radio frequency card and a compass correction card are mounted above the compass. The compass indicates the magnetic heading of the helicopter. The card of the compass is graduated in 5-degree increments. The cardinal headings are shown in enlarged letters: N for north at zero degrees, E for east at 90 degrees, S for south at 180 degrees, and W for west at 270 degrees. The card is read against a fixed lubber line, which is the vertical, white line on the face of the instrument. The compass correction card is mounted above the compass. The compass card holder, which is secured by screws, holds the correction card in position. The compass correction card, which varies with each helicopter, shows indicated compass readings and deviation necessary for true compass readings.

10—45. Troubleshooting. For troubleshooting procedures for the standby compass, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive card error	Improper compensation	Compensate standby compass. (Refer to paragraph 10—50.)
	External magnetic influence	Locate magnetic influence and eliminate if possible.
	Air in bowl	Replace standby compass. (Refer to paragraphs 10—47 and 10—49)
	Insufficient liquid in bowl	Replace standby compass. (Refer to paragraphs 10—47 and 10—49.)
	Worn or deteriorated shock mounts	Replace mounts. (Refer to paragraphs 10—47 and 10—49.)
Card element not level	Leaking float chamber	Replace standby compass. (Refer to paragraphs 10—47 and 10—49.)
	Card magnets detached from card	Replace standby compass. (Refer to paragraphs 10—47 and 10—49.)
Card sluggish	Dirty jewels or pivots restricting rotation	Replace standby compass. (Refer to paragraphs 10—47 and 10—49.)
	Weak card magnets	Replace standby compass. (Refer to paragraphs 10—47 and 10—49.)
	Instrument heavily compensated	Compensate properly. (Refer to paragraph 10—50.)
Liquid leakage	Leaking gasket	Replace standby compass. (Refer to paragraphs 10—47 and 10—49.)
	Loose bezel screws	Replace standby compass. (Refer to paragraphs 10—47 and 10—49)
Defective light	Broken case	Replace standby compass. (Refer to paragraphs 10—47 and 10—49.)
	Burned out bulb	Replace bulb.

10—46. Operational Check. a. Start engine and engage main rotor in accordance with TM 55-1520-202-10.

Warning

Engine operation will be performed by authorized personnel only.

b. Using standby compass and standby compass correction card as a guide, place helicopter on indicated magnetic headings of north, east, south, and west. Actual magnetic heading of helicopter at each position should agree with corrected indication of standby compass.

c. Shut down engine in accordance with TM55-1520-202-10.

10–47. Removal. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove attaching hardware and remove standby compass from bracket.

c. Remove disconnect plug at rear of standby compass. Remove compass.

d. Unscrew bracket from frame.

10–48. Inspection. a. Inspect electrical disconnect plug for damage and bent pins. Inspect wiring for security to plug and for damage and deterioration of insulation.

b. With magnetic compass in normal position, no air bubbles should be visible.

c. Inspect index markings and numerals for legibility.

d. Inspect case for damage.

e. Inspect window for scratches and discoloration.

10–49. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Attach bracket to frame with screws.

c. Using appropriate wiring diagram for reference, install disconnect plug to standby compass and secure with lock wire.

d. Secure standby compass to bracket with screws, washers, and nuts.

10–50. Adjustment. Prior to adjusting compensating standby compass, make certain that liquid is clear and no air bubbles show when the compass is in normal position. Check that card is level and, when deflected a few degrees on each side of equilibrium position, returns to original position within friction error tolerance for compass.

a. Place helicopter on a compass rose.

Note

All adjustments of compensators must be made with a nonmagnetic screwdriver.

b. Position screw-type compensators to null effect by aligning dots on screws with dots on indicator.

Note

Before proceeding, remove tool boxes or other large metallic objects not normally in helicopter during flight. Remove tools and other metallic objects from pockets and person which might produce errors in compass reading.

c. Start engine and engage main rotor in accordance with TM 55-1520-202-10. Be sure all electrical equipment used during flight is turned on.

Warning

Engine operation will be performed by authorized personnel only.

d. With engine running and main rotor engaged, place helicopter on south magnetic heading and record compass deviation from 180 degrees.

e. Place helicopter on west magnetic heading and record deviation from 270 degrees.

f. Place helicopter on north magnetic heading and record deviation from zero. Determine index error C according to example in step *k*. With helicopter still on north heading, adjust NORTH-SOUTH compensating screw to change compass reading plus or minus an amount equal to index error C.

g. Place helicopter on east magnetic heading and note deviation from 90 degrees. Determine index error B according to step *k*. Adjust EAST-WEST compensator to change compass reading plus or minus an amount equal to index error B.

h. With helicopter still on east heading, determine index error A according to step *k*.

i. If index error A exceeds 1 degree, accomplish compensation by turning face of compass relative to plane of instrument panel by using washers or spacers. Adjust compass to change readings, plus or minus, an amount equal to index error A.

j. Swing helicopter for residual deviations by placing helicopter on eight magnetic headings approximately 45 degrees apart.

Note

Compass reading corresponding to exact heading on each of eight headings shall be recorded on compass correction card. Spread between maximum negative deviation of all readings shall not exceed 8 degrees.

k. Compute index errors algebraically as follows:

$$\text{Index error C} = \frac{\text{North Deviation} - \text{South Deviation}}{2}$$

$$\text{Index error B} = \frac{\text{East Deviation} - \text{West Deviation}}{2}$$

$$\text{Index error A} = \frac{\begin{matrix}\text{North} \\ \text{Deviation}\end{matrix} + \begin{matrix}\text{East} \\ \text{Deviation}\end{matrix} + \begin{matrix}\text{South} \\ \text{Deviation}\end{matrix} + \begin{matrix}\text{West} \\ \text{Deviation}\end{matrix}}{4}$$

Example:

Deviations with compensator set to null effect.

	Magnetic Heading	Compass Reading	Deviation
South	180°	175-1/2°	4-1/2°
West	270°	276°	-6°
North	000°	006-1/2°	-6-1/2°
East	090°	090°	0°

$$\text{Index error C} = \frac{(-6\text{-}1/2) - (\ 4\text{-}1/2)}{2} = \frac{-11}{2}$$

$$= -5\text{-}1/2 \text{ degrees}$$

$$\text{Index error B} = \frac{(0) - (-6)}{2} = \frac{+6}{2}$$

$$= +3 \text{ degrees}$$

$$\text{Index error A} = \frac{(-6\text{-}1/2) + (0) + (4\text{-}1/2) + (-6)}{4}$$

$$= \frac{-8}{4} = -2 \text{ degrees}$$

l. Shut down engine in accordance with TM55-1520-202-10.

10–51. Eight-Day Clocks. Helicopters are equipped with eight-day, 12-hour, spring-wound clocks. Model CH-34A helicopters are equipped with a clock on pilot's side only. (See figures 10–1 and 10–2.) Model CH-34C helicopters serial No. 57-1742 and subsequent are equipped with clocks on the pilot's and copilot's side of the instrument panel. (See figure 10–3.)

10–52. Removal. Remove eight-day clocks in accordance with paragraph 10–7*a*.

Note

Eight-day clocks are spring wound and have no connections at rear of case.

10–53. Inspection. a. Inspect glass for scoring and cracks.

b. Inspect case and controls for dents and other damage.

10–54. Installation. Install eight-day clocks in accordance with paragraph 10–7*b*.

Note

Eight-day clocks are spring wound and have no connections at rear of case.

Section IV Engine and Miscellaneous Instruments

10–55. Description. The engine instruments are composed of the dual tachometer system, manifold pressure indicating system, carburetor air temperature indicating system, cylinder temperature indicating system, and the engine oil temperature indicating system. The engine instruments provide the pilot and copilot with continuous indications of the operating condition of the engine. The miscellaneous instruments include other pressure and temperature indicating systems in the helicopter.

10–56. Dual Tachometer System. The dual tachometer system provides the pilot and copilot with a continuous indication of engine and main rotor rpm. Identical dual tachometer indicators, mounted on either side of the instrument panel, are electrically connected to engine and main rotor tachometer generators. The engine and main rotor tachometer generators are driven by the engine and main transmission respectively. The generators supply power at a frequency proportional to their driven speed which drives the synchronous motors in the indicator. These motors turn permanent magnets, located in drums in the indicators. Eddy currents generated in the drum create torque on the drums and pointers, which are restrained by calibrated hairsprings. The face of the indicator has a range of 0 to 4000 rpm, calibrated in increments of 100 rpm. The long pointer indicates engine rpm directly on the scale. The short pointer indicates rotor rpm at a ratio of 1.0 to 11.293 on the engine rpm scale. The engine tachometer is mounted on the left accessory drive housing of the engine. The main rotor tachometer-generator is mounted on the left rear of the main transmission lower housing. The tachometer-generators supply voltage and frequency in proportion to the speed at which they are driven.

10–57. Troubleshooting. For troubleshooting procedures for the dual tachometer system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive scale error	Weak magnets in tachometer-generator	Replace associated tachometer-generator. (Refer to paragraphs 10–59 and 10–61.)
Pointer moves backward	Wiring reversed at plug	Change wiring at plug.
Indication only one-half actual speed	Wiring connected to wrong terminal on indicator	Refer to wiring diagram and rewire correctly.
No reading on indicator, either permanent or intermittent	Break or short circuits in leads	Repair or replace leads.
	Poor connection at plugs	Clean or tighten terminals.
	Break in unit circuit	Replace indicator or tachometer-generators, as necessary. (Refer to paragraphs 10–59 and 10–61.)
Low reading on indicator, either permanent or intermittent	Poor connection at terminals	Clean and tighten terminals at plugs.
High reading on indicator, either permanent or intermittent	Indicator resistance out of adjustment	Replace indicator. (Refer to paragraph 10–7*a* and *b*.)

10–58. Operational Check. *a.* With engine and main rotor inoperative, both pointers on each indicator should indicate zero rpm.

Caution

Personnel performing this check should familiarize themselves with the remaining steps of this procedure before attempting them, as prolonged engine operation with rotor clutches disengaged is not recommended.

b. Start engine in accordance with TM 55-1520-202-10, and leave rotor clutch disengaged.

Warning

Operation of engines will be performed by authorized personnel only.

c. Carefully advance throttle until engine rpm is 2000 as shown on one indicator. Remaining engine indicator should be at 2000 rpm ± 50 rpm. Rotor indicators should remain at zero.

d. Engage main rotor in accordance with applicable flight manual and observe rotor pointers. Rotor pointers should show stable indication within ±5 rpm of each other.

e. Shut down engines in accordance with TM 55-1520-202-10.

10–59. Removal. *a.* Remove dual tachometer indicator in accordance with paragraph 10–7*a*.

b. Open doors to front of engine compartment.

c. Disconnect electrical wiring at tachometer-generator.

d. Remove washers and nuts at mounting flange.

e. Remove tachometer-generator and gasket from accessory drive pad.

f. Lower left-hand and right-hand service platforms.

g. Disconnect electrical wiring at tachometer-generator.

h. Remove washers and nuts at mounting flange.

i. Remove tachometer-generator and gasket from accessory drive pad.

10–60. Inspection. *a.* Inspect dual tachometer indicator case and glass for excessive dents or cracks.

b. Inspect electrical connector on rear of dual tachometer indicator case for bent pins, damaged threads, and corrosion.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling point.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect each tachometer generator for a dented case. Inspect each electrical disconnect plug on rear of tachometer generator for bent pins, damaged threads, corrosion, and contamination by grease, oil, etc.

f. Inspect base of each tachometer generator for stripped threads.

g. Inspect shaft keyway for excessive wear. Make sure shaft turns freely.

10–61. Installation. *a.* Install dual tachometer indicator in accordance with paragraph 10–7*b*.

Note

Before installing each tachometer-generator use a suitable phase-indicating meter to determine phase rotation of the generator. Phase rotation should be B, A, and C. Exchange leads of phases A and C to correct phase rotation.

b. Wipe transmission generator drive pad clean. Place a clean dry gasket on drive pad.

c. Position tachometer-generator on drive pad with electrical connection turned up.

d. Secure tachometer-generator to drive pad with washers and nuts.

e. Connect electrical wiring to tachometer-generator.

f. Close and secure left-hand and right-hand service platforms.

g. Wipe engine accessory drive pad and tachometer-generator flange clean. Place clean dry gasket on drive pad.

h. Position tachometer-generator on drive pad with electrical receptacle to right.

Note

On helicopter serial No. 55-4489 and subsequent, electrical receptacle is on top.

i. Secure tachometer-generator to drive pad with washers and nuts. Tighten nuts to a torque of 50 to 70 inch-pounds.

j. Connect electrical wiring to tachometer-generator.

k. Close and secure engine compartment doors.

10–62. Manifold Pressure Gages. The pilot's and copilot's manifold pressure gages (figures 10–1 through 10–3) are mounted on the instrument panel and connected to the engine intake manifold by tubing. Quick disconnect fittings are provided at the rear of each indicator and at the accessory compartment shroud. Each manifold pressure gage dial is marked in 1-inch Hg increments, with a range of 10 to 75 inches Hg. The gages are calibrated to indicate absolute pressure in inches of mercury measured at the intake manifold of the engine. A purge valve, located directly below the manifold pressure gage on the pilot's side of the instrument panel, can be used to purge the system of condensed moisture when the engine is operating with a manifold pressure less than atmospheric pressure. When the manifold pressure system purge valve is pressed, air at atmospheric pressure enters the tubing of the system and carries any moisture in the tubing into the engine intake manifold.

10–63. Troubleshooting. For troubleshooting procedures for the manifold pressure gages, proceed as follows:

Note

Malfunction of tubing, connectors, or other components in system will show up on both gages. Malfunction of either gage will not usually affect the other.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive error at existing barometric pressure	Pointer shifted	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
Excessive error when engine is running	Leak in line	Tighten or replace line as necessary.
Sluggish or jerky pointer movement	Improper damping adjustment	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
	Excessive friction	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
Broken or loose cover glass	Vibration or excessive pressure	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
Excessive pointer oscillation	Insufficient hairspring tension or end play in rocker arm	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
Low reading	Loose pointer	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
	Leak in diaphragm	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
	Leak in line	Tighten coupling on line
High reading	Loose pointer	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No pointer movement	Leak in diaphragm	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)
Erratic pointer movement	Loose mounting	Tighten mounting screws of manifold pressure gage; tighten engine pressure connection.
	Worn or damaged gear teeth	Replace manifold pressure gage. (Refer to paragraphs 10–65 and 10–67.)

10–64. Operational Check. a. With engine inoperative, operate manifold purge valve to relieve any pressure in system. Manifold pressure indication on both gages should equal ambient barometric pressure.

b. Start engine and engage main rotor in accordance with TM 55-1520-202-10. With indicated manifold pressure below 30 inches Hg, operate purge valve. Both gages should rise from indicated manifold pressure to approximately 29 inches Hg.

Warning

Operation of engine will be performed by authorized personnel only.

c. With purge valve closed and engine operating normally, gages should show equal reading within normal operating range of engine.

d. Shut down engine in accordance with TM55-1520-202-10.

10–65. Removal. a. Remove cowl panel from top of instrument panel and disconnect tubing from rear of manifold pressure gages.

b. Disconnect and remove tubing from elbow on purge valve to pilot's manifold pressure gage.

c. Remove mounting screws from face of manifold pressure gages and remove gages and light shields from panel.

10–66. Inspection. a. Inspect manifold pressure gage case and glass for excessive dents and cracks.

b. Inspect fitting at rear of manifold pressure gage for stripped threads and other conditions which would prevent an airtight connection.

c. Inspect index lines and numerals for legibility.

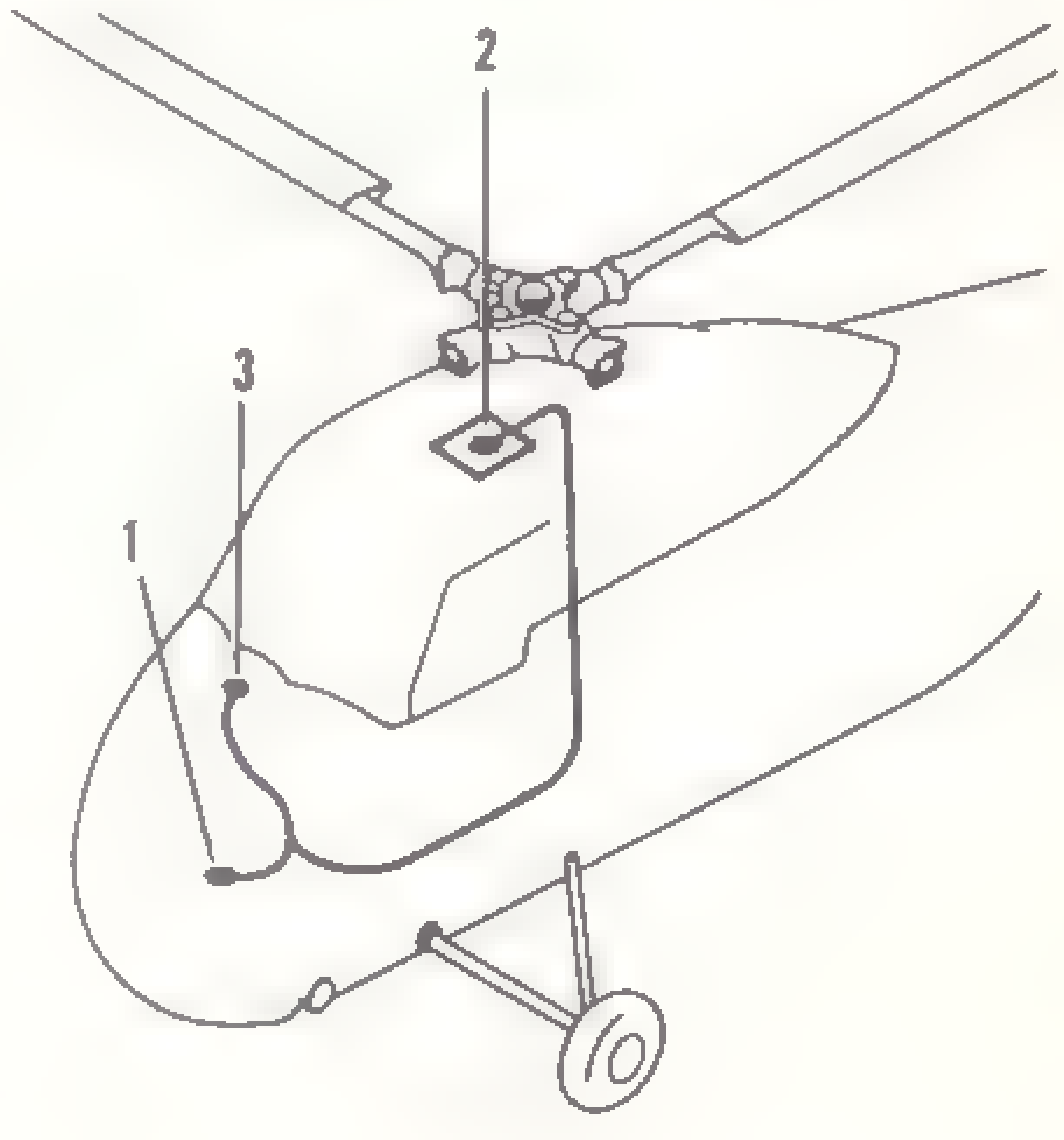
d. Make sure range markings are legible. Refer to TM 55-1520-202-10 for location of range markings.

10–67. Installation. a. Install light shields and gages to instrument panel and secure with mounting screws.

b. Install tubing from elbow on purge valve to pilot's manifold pressure gage.

c. Connect tubing to rear of instruments and install cowl panel to top of instrument panel and secure with fasteners.

10–68. Carburetor Air Temperature Indicating System. The carburetor air temperature indicating system (figure 10–12) consists of carburetor air temperature indicator (3), mounted on the instrument panel, and a carburetor air temperature bulb (1), located in the air intake duct of the carburetor air induction system. Power for the system is provided through a circuit breaker (2), located on the overhead control panel. The carburetor air temperature indicator (figures 10–1 through 10–3), located on the instrument panel, is a current-sensitive meter marked with 5-degree graduations and has a temperature range of –40°C to +40°C (–40°F to +104°F). The carburetor air temperature bulb is a temperature-sensitive electrical device with decreases in resistance with a rise



1. Carburetor Air Temperature Bulb
2. Circuit Breaker
3. Carburetor Air Temperature Indicator

Figure 10–12. Carburetor air temperature indicating system

in temperature. Changes in resistance cause a change in current flow from the primary bus through the indicator and temperature bulb.

10–69. Troubleshooting. For troubleshooting procedures for the carburetor air temperature indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer remains on mechanical 0	Open circuit in power supply or poor ground connection	Remove connector plug and test for ac voltage from pin A to ground, also from pin A to pin C.
Pointer forced off bottom end of scale	Resistance bulb open or break in bulb wiring	Replace bulb or repair wiring. (Refer to paragraphs 10–71 and 10–73.)
	Open circuit in indicator	Replace indicators. (Refer to paragraph 10–8*a* and *b*.)
Pointer forced off top end of scale	Bulb or wiring short-circuited	Replace bulb or repair wiring (Refer to paragraphs 10–71 and 10–73.)
	Ground connected to wrong wire from bulb	Reconnect ground to proper bulb wire.
Erratic indications	Defective wiring or defective bulb	Repair wiring or replace bulb. (Refer to paragraphs 10–71 and 10–73.)
	Defective connection in indicator	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer remains on scale with power off	Foreign material in indicator	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)

10–70. Operational Check. a. Connect external power source and engage CARB AIR TEMPERATURE circuit breaker on overhead control panel. With engines cold and inoperative, carburetor air temperature indicator should show a stable indication equal to temperature of ambient air.

Note

If helicopter has been parked in direct sunlight, indicated temperature may be somewhat higher than ambient temperature due to heating effect of sun.

b. Disconnect external power source.

10–71. Removal. a. Remove carburetor air temperature indicator in accordance with paragraph 10–8*a*.

b. Open nose doors and disconnect carburetor air temperature wiring from terminals at engine shroud.

c. Unscrew temperature bulb from air intake duct above carburetor.

10–72. Inspection. a. Inspect carburetor air temperature indicator case and glass for excessive dents or cracks.

b. Inspect electrical connector at rear of carburetor air temperature indicator case and temperature bulb for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect temperature bulb for stripped threads, dents, and cracks.

10–73. Installation. a. Install carburetor air temperature indicator in accordance with paragraph 10–8*b*.

b. Screw temperature bulb into air intake duct above carburetor.

c. Using proper electrical wiring diagram for reference, connect leads from temperature bulb to proper terminals at engine shroud. Close nose doors.

10–74. Cylinder Temperature Indicating System. The cylinder temperature indicating system (figure 10–13) consists of a cylinder temperature indicator (3), cylinder temperature bulb (1), circuit breaker (2), and necessary wiring. The cylinder temperature indicating system is capable of detecting cylinder temperatures of from −50°C to +300°C (−58°F to +572°F). Power for the system is derived from the primary bus through a circuit breaker on the overhead control panel. The cylinder head temperature indicator (figures 10–1 through 10–3) is basically a current-sensitive D'Arsonval galvanometer movement having a

spring loaded moving coil. Current flowing in the coil causes it to rotate in a direction opposing the forces on the spring. The movement of the pointer, attached to the coil, is proportional to the electric current flowing in the circuit. The entire movement is mounted in a shielded case to minimize interference by stray magnetic fields. The cylinder temperature bulb is a bayonet, lock-type, temperature-sensitive device which increases in resistance with an increase in temperature. Changes in resistance cause a change in current flow from the primary bus through the indicator to which the temperature bulb is connected. The cylinder temperature bulb is located in the No. 7 cylinder wall of the engine.

10–75. Troubleshooting. For troubleshooting procedures for the cylinder temperature indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer forced off bottom end of scale	Resistance bulb open or break in bulb wiring	Replace bulb or repair wiring. (Refer to paragraphs 10–77 and 10–79.)
Pointer remains on mechanical 0	Open circuit in power supply or poor ground connection	Remove connector plug and test for ac voltage from pin A to ground, also from pin A to pin C.
Pointer forced off top end of scale	Bulb or wiring short-circuited	Replace bulb or repair wiring. (Refer to paragraphs 10–77 and 10–79.)
	Ground connection to wrong lead from bulb	Reconnect ground to proper bulb wire.
Erratic indications	Defective wiring or defective bulb	Repair wiring or replace bulb. (Refer to paragraphs 10–77 and 10–79.)
	Defective cylinder temperature indicator	Replace cylinder temperature indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer remains on scale with power off	Foreign material in cylinder temperature indicator movement	Replace cylinder temperature indicator. (Refer to paragraph 10–8*a* and *b*.)

10–76. Operational Check. a. Connect external power source and engage cylinder head temperature circuit breaker. With engine cold and inoperative, indicator should show stable indication equal to ambient temperature.

Note

If helicopter has been parked in direct sunlight, indicated temperature may be somewhat higher than that of ambient air due to heating effect of sun.

b. Start engine in accordance with TM 55-1520-202-10.

Warning

Operation of engine will be performed by authorized personnel only.

c. Disconnect external power source.

d. With engine operating normally, observe cylinder temperature indicator. Indicator should be stable and within operating range of engine.

e. Shut down engine in accordance with TM 55-1520-202-10.

10–77. Removal. a. Remove cylinder temperature indicator in accordance with paragraph 10–8*a*.

b. Open nose doors and remove cylinder temperature bulb from No. 7 cylinder by pressing in, giving one quarter turn, and releasing.

c. Remove tape and disconnect wiring from temperature bulb leads.

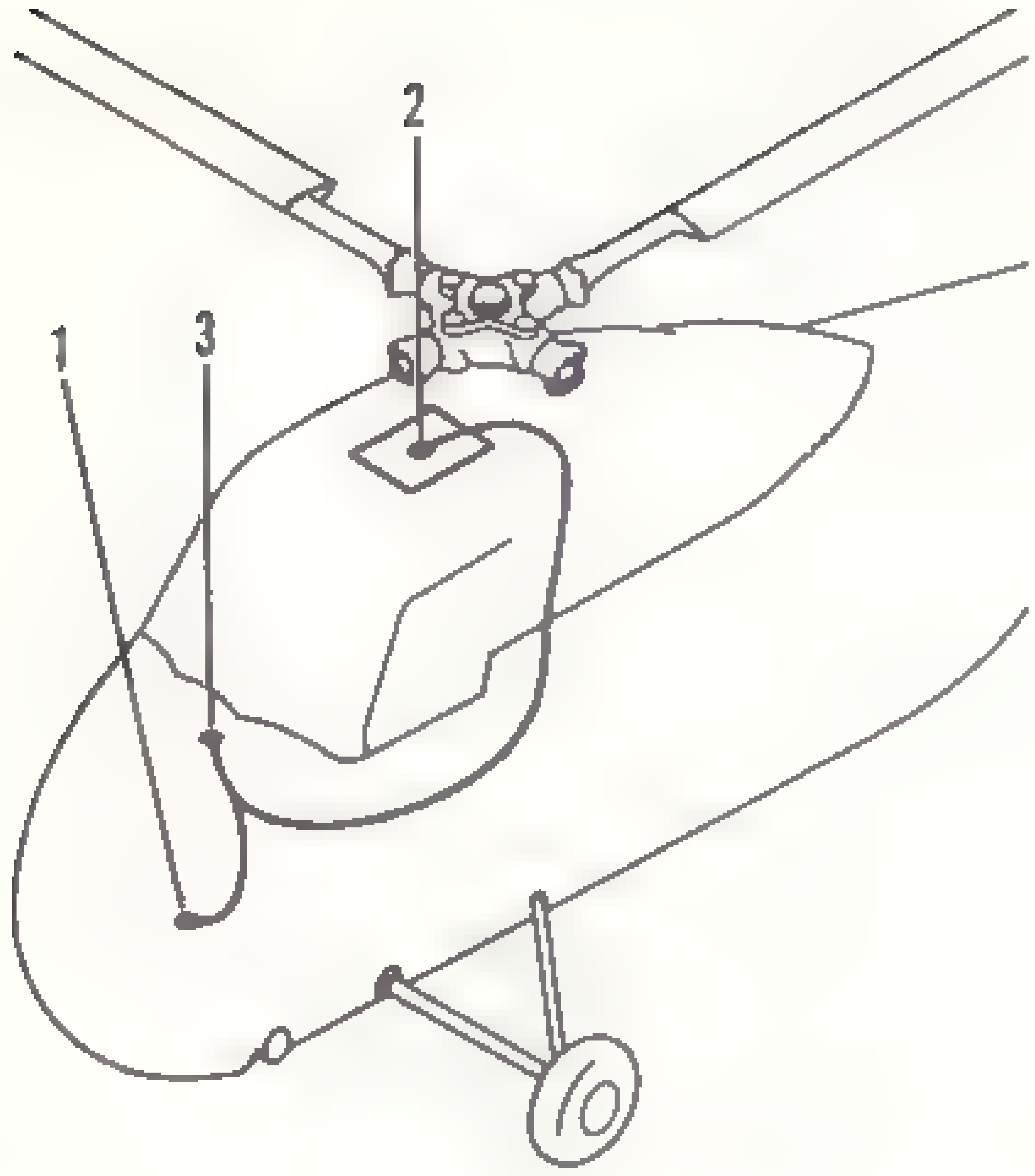
10–78. Inspection. a. Inspect cylinder temperature indicator case and glass for excessive dents or cracks.

b. Inspect electrical connector at rear of cylinder temperature indicator case and temperature bulb for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

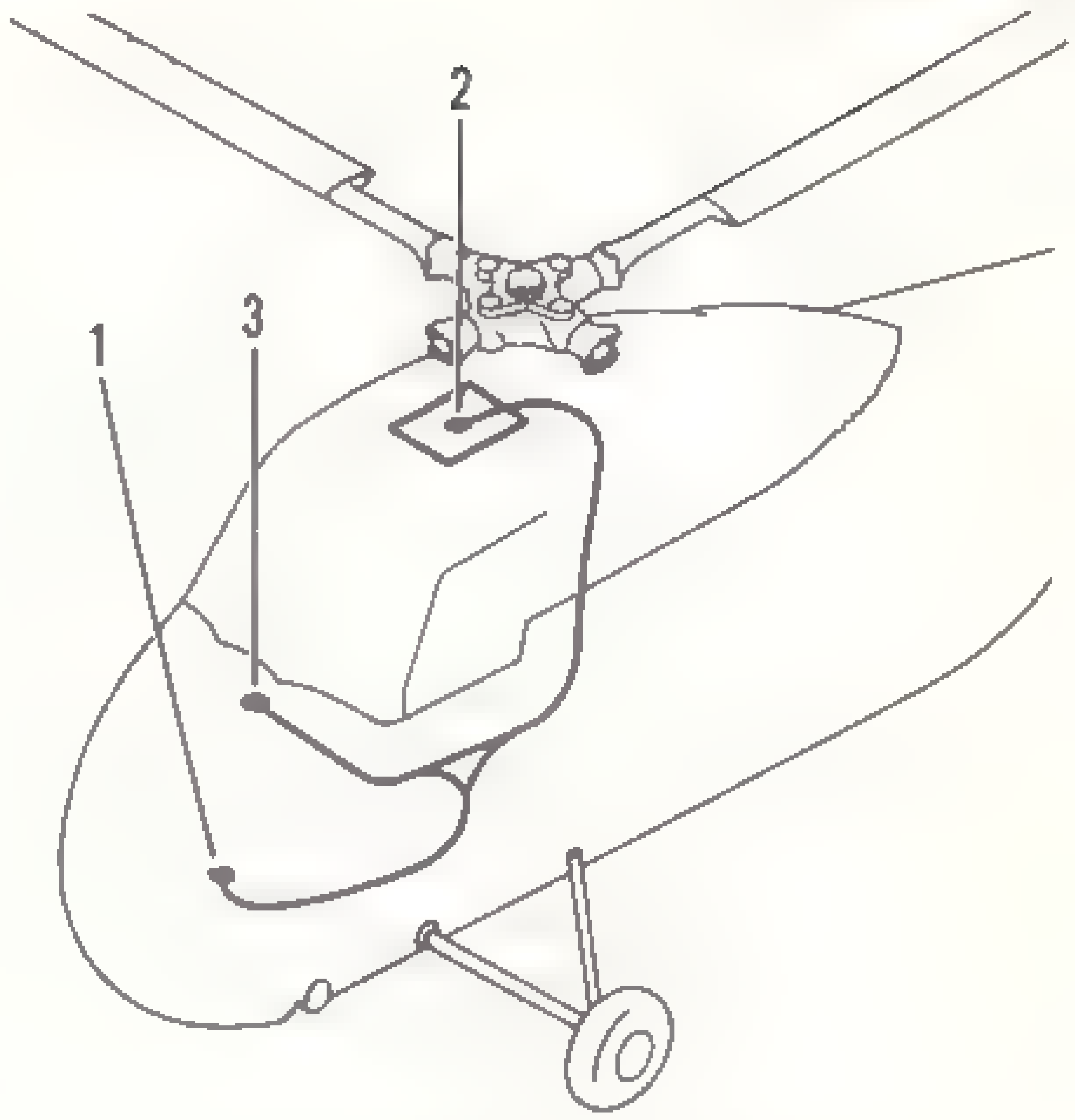
d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect temperature bulb for stripped threads, dents, and cracks.



1. Cylinder Temperature Bulb
2. Circuit Breaker
3. Cylinder Temperature Indicator

Figure 10—13. Cylinder temperature indicating system



1. Engine Oil Pressure Transmitter
2. Fuse
3. Engine Oil Pressure Indicator

Figure 10—14. Engine oil pressure indicating system

10—79. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Using proper wiring diagram for reference, connect leads of temperature bulb to proper wires.

c. Tape two connections separately with tape (item 42, table 1—8), then tape both connections together. Apply a heavy coat of shellac (item 43, table 1—8) over tape and allow to dry.

d. Install temperature bulb in proper position in No. 7 cylinder wall and secure by pressing in and giving one quarter turn.

e. Close nacelle doors.

f. Install cylinder temperature indicator in accordance with paragraph 10—8*b*.

10—80. Engine Oil Pressure Indicating System. The engine oil pressure indicating system (figure 10—14) consists of an engine oil pressure indicator (3), located on the instrument panel, and an engine oil pressure transmitter (1), located on the right side of the helicopter aft of the engine compartment bulkhead. Power for the system is supplied through a fuse (2), located on the overhead control panel. The engine oil pressure indicator (figures 10—1 through 10—3) contains an autosyn connected to the pointer. The dial has a range of 0 to 200 psi in increments of 10 psi. The autosyn in the indicator positions the needle in accordance with the autosyn in the pressure transmitter. The engine oil pressure transmitter is connected to the 26-volt ac power source and its indicator by wiring and to the main transmitter flange on the engine by tubing. Oil pressure admitted to the transmitter causes changes in position of the Bourdon tube which are transmitted mechanically to the rotor of the autosyn transmitter. Changes of position of the autosyn transmitter are followed by a similar synchro in the indicator, causing the indicator needle to move.

10—81. Troubleshooting. For troubleshooting procedures for the engine oil pressure indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Indicator pointer remains at zero or only moves through a restricted arc	Broken Bourdon tube in transmitter	Replace transmitter. (Refer to paragraphs 10–83 and 10–85.)
	Defective wiring	Repair wiring.
	Leak in pressure tubing	Replace tubing.
	Pressure tubing clogged	Remove foreign matter from tubing. Disconnect line at both ends and blow clear with compressed air.
	Loose link screw	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
Erratic pointer movement	Defective engine oil pressure indicator	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Excessive ball bearing friction	Replace transmitter. (Refer to paragraphs 10–83 and 10–85.)
	Worn or damaged gear teeth	Replace transmitter. (Refer to paragraphs 10–83 and 10–85.)
	Improper pinion and sector mesh	Replace transmitter. (Refer to paragraphs 10–83 and 10–85.)
	Foreign matter in pinion or sector gear teeth	Replace transmitter. (Refer to paragraphs 10–83 and 10–85.)
	Loose mounting	Tighten mounting screws of transmitter and indicator.
Low reading on indicator	Leak in pressure tubing	Replace tubing. (Refer to paragraphs 10–83 and 10–85.)
	Pressure tubing clogged	Remove foreign matter from tubing.
	Pointer set too low	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Excessive play in transmitter linkage	Replace transmitter. (Refer to paragraphs 10–83 and 10–85.)
	Loose pointer	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
High reading on engine oil pressure indicator	Pointer set too high	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Loose pointer	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Fatigue in Bourdon tube	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
Excessive pointer oscillation	Loose mounting	Tighten transmitter mounting screws.
	Loose pointer	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
Sluggish operation	Dirty or corroded rotor	Replace engine oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)

10—82. Operational Check. *a.* Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove and inspect ENG OIL PRESS fuse. Replace if defective and reinstall.

c. Connect external power source, engage main inverter circuit breakers, and place inverter switch in FLT MAIN position. Engine oil pressure indication should be 0.

d. Start engine in accordance with TM 55-1520-202-10 and observe engine oil pressure indicator as engine is started. Engine oil pressure indication should be within normal operating range of engine within 30 seconds after engine is started.

Warning

Operation of engine will be performed by authorized personnel only.

Caution

If indicated oil pressure of engine does not rise to at least 65 psi within 30 seconds after starting, engine should be shut down to avoid possible damage due to lack of proper oil pressure in engine.

e. Shut down engine in accordance with TM 55-1520-202-10 and disconnect external power source.

10—83. Removal. *a.* Remove engine oil pressure indicator in accordance with paragraph 10—8*a*.

b. Open nose doors and disconnect pressure tubing from quick disconnect on accessory compartment shroud and from pressure transmitter.

c. Remove electrical disconnect plug from pressure transmitter.

d. Remove attaching hardware and remove pressure transmitter from mounting bracket.

10—84. Inspection. *a.* Inspect engine oil pressure indicator case and glass for excessive dents or cracks.

b. Inspect electrical connectors on indicator and pressure transmitter for bent pins, corrosion, and signs of arcing.

c. Inspect indicator index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect pressure transmitter for damaged fitting or stripped threads.

10—85. Installation. *a.* Place battery and generator switches in OFF position and make sure external power is disconnected.

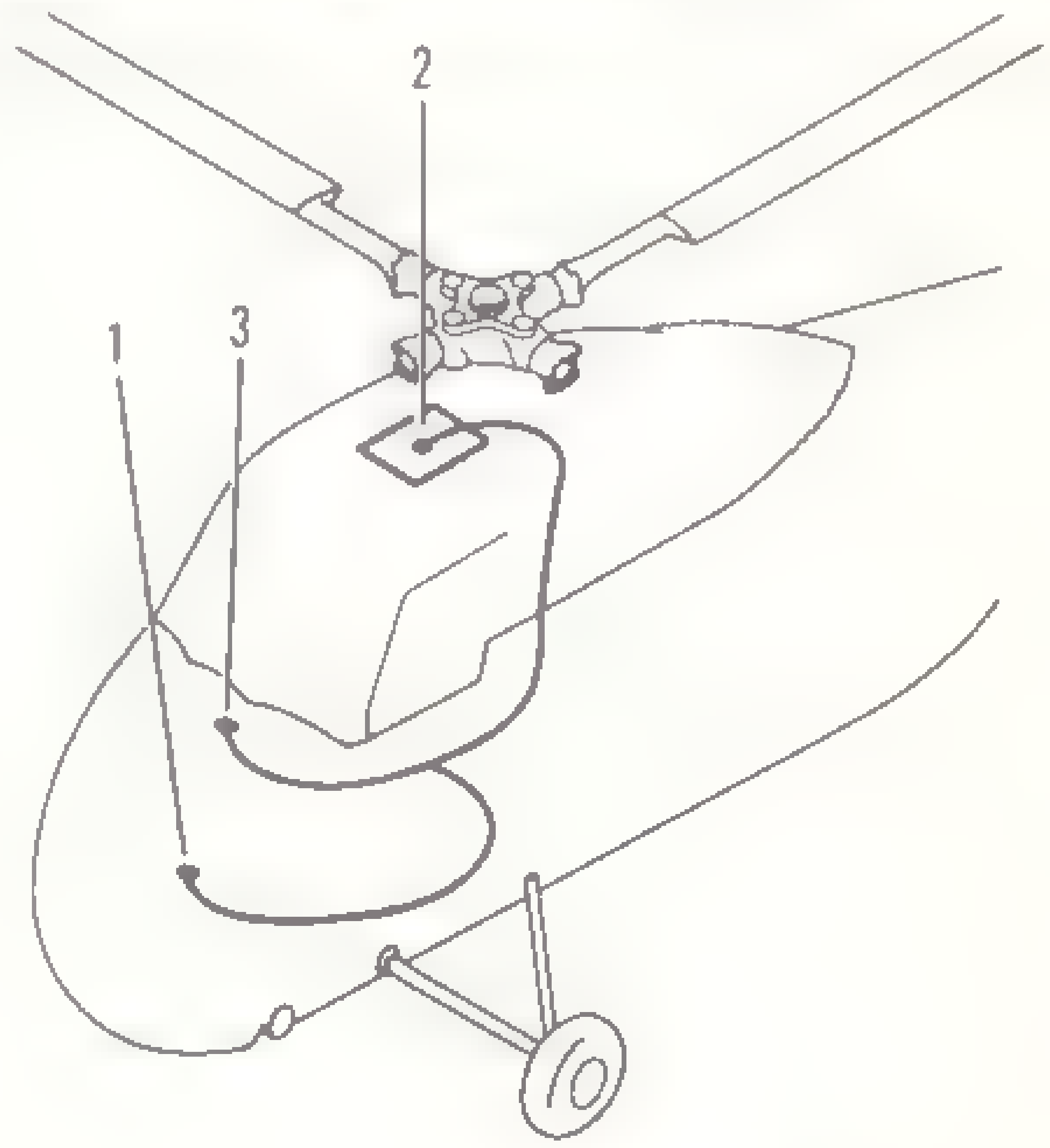
b. Install pressure transmitter in its mounting bracket and secure with attaching hardware.

c. Install tubing on pressure transmitter and to quick disconnect on the accessory compartment shroud.

d. Install electrical disconnect plug to pressure transmitter and secure with lock wire. Close nose doors.

e. Install engine oil pressure indicator in accordance with paragraph 10—8*b*.

10—86. Engine Oil Temperature Indicating System. The engine oil temperature indicating system (figure 10—15) consists of an engine oil temperature indicator (3), engine oil temperature bulb (1), and connecting wiring. The indicator range is from —70°C to + 150°C (—56°F to + 302°F). The power for the system is derived through a circuit breaker (2) from the primary bus. The engine oil temperature indicator, (figures 10—1 through 10—3), located on the instrument panel, is basically a D'Arsonval meter having a permanent magnet and a rotating coil with a pointer and spring attached. Current flowing in the coil causes it to rotate in a direction opposing the action of the spring. Movement of the coil and its attached pointer is proportional to the current flowing in the circuit. The entire meter movement is mounted in a shielded case to minimize interference by stray magnetic fields. The engine oil temperature bulb, located in the engine oil pump housing, is a temperature-sensitive device having resistance changes with changes in temperature. Changes in bulb resistance



1. Engine Oil Temperature Bulb
2. Circuit Breaker
3. Engine Oil Temperature Indicator

Figure 10—15. Engine oil temperature indicating system

cause changes in current flow through the indicator. These changes are shown by movement of the indicator needle.

10–87. Troubleshooting. For troubleshooting procedures for the engine oil temperature indicating systems, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer fails to respond	Fuse blown	Replace fuse.
	Loose connection at bulb or indicator	Check connections for tightness.
	Broken wire in circuit	Repair or replace broken wire.
	Ground in bulb wiring	Repair or replace wire.
	Defective bulb	Replace bulb. (Refer to paragraphs 10–89 and 10–91.)
	Defective indicator	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer goes off high end of scale	Broken ground wire	Repair or replace broken wire.
	Defective bulb	Replace bulb (Refer to paragraphs 10–89 and 10–91.)
	Defective indicators	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
Indicator operates intermittently	Loose connection or broken wire	Tighten connection. Repair or replace wire.
	Defective bulb	Replace bulb. (Refer to paragraphs 10–89 and 10–91.)
	Defective indicator	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer goes off low end of scale	Defective bulb	Replace bulb. (Refer to paragraphs 10–89 and 10–91.)
	Broken wire between bulb and indicator	Replace wire. (Refer to paragraph 10–8*a* and *b*.)
Excessive pointer oscillation	Loose connection or broken wire	Tighten connection. Repair or replace wire.
	Defective bulb	Replace bulb. (Refer to paragraphs 10–89 and 10–91)
	Defective indicator	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
Obviously incorrect temperature reading	Defective bulb	Replace bulb. (Refer to paragraphs 10–89 and 10–91.)
	Defective indicator	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer fails to go off scale with current off	Defective indicator	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)

10–88. Operational Check. a. Connect external power source and engage OIL INLET circuit breaker on overhead control panel. With engine cold and inoperative, indicator should show stable indication equal to ambient temperature.

Note

If helicopter has been parked in direct sunlight, indicated temperature may be somewhat higher than ambient temperature due to heating effect of sun.

b. Start engine in accordance with TM 55-1520-202-10 and disconnect external power source.

Warning

Operation of engine will be performed by authorized personnel only.

c. With engine warmed up and operating normally, oil temperature indication should be stable and within normal operating range of engine.

d. Shut down engine in accordance with TM 55-1520-202-10. With all power off, temperature indicator should read off scale at low end.

10–89. Removal. a. Remove engine oil temperature indicator in accordance with paragraph 10–8*a*.

b. Open nose doors and remove electrical disconnect plug from rear of temperature bulb, located in oil pump housing.

c. Provide a suitable plug and remove engine oil temperature bulb and gasket. Plug oil pump housing as soon as bulb is removed to prevent spillage of oil.

10–90. Inspection. a. Inspect engine oil temperature indicator case and glass for excessive dents or cracks.

b. Inspect electrical connector at rear of engine oil temperature indicator case and temperature bulb for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect temperature bulb for stripped threads, dents, and cracks.

10–91. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove plug from oil pump housing and install engine oil temperature bulb with new gasket.

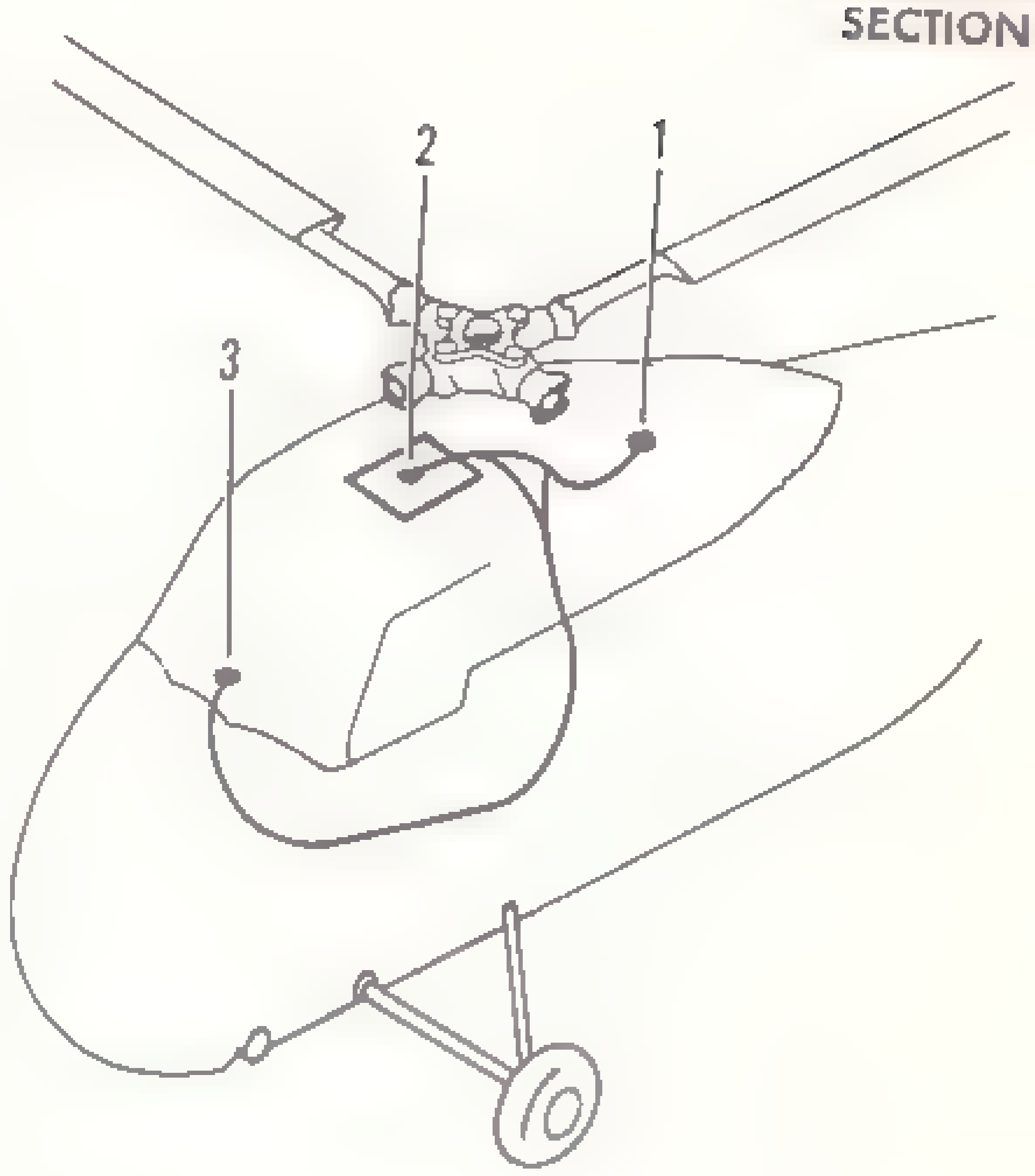
c. Install electrical disconnect plug to rear of temperature bulb and secure with lock wire.

d. Preoil engine before operating.

e. Close nacelle doors.

f. Install engine oil temperature indicator in accordance with paragraph 10–8*b*.

10–92. Main Transmission Oil Pressure Indicating System. The main transmission oil pressure indicating system (figure 10–16) consists of main transmission oil pressure indicator (3), main transmission oil pressure transmitter (1), and necessary wiring. Power for the system is supplied through a fuse (2) on the overhead control panel. A change of pressure in the oil admitted to the transmitter causes a Bourdon tube and linkage to move the rotor of an autosyn in the pressure transmitter. This autosyn is connected to an autosyn in the indicator which moves the indicator pointer. The main transmission oil pressure indicator (figures 10–1 through 10–3), located on the instrument panel, provides the pilot and copilot with a continuous visual indication of oil pressure at the oil inlet port. The dial has a range of 0 to 200 psi, graduated in increments of 10 psi. The indicator consists of an autosyn connected to the pointer and a hermetically-sealed case. The main transmission oil pressure transmitter, located on the transmission deck adjacent to the rear left support assembly on the main transmission, is connected by tubing to the oil inlet fitting on the main transmission and senses system pressure at this point.



1. Main Transmission Oil Pressure Transmitter
2. Fuse
3. Main Transmission Oil Pressure Indicator

Figure 10–16. Main transmission oil pressure indicating system

10–93. Troubleshooting. For troubleshooting procedures for the main transmission oil pressure indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No pointer movement	Leak in pressure line	Pressure test line. Repair or replace hose and fittings. (Refer to paragraphs 10–95 and 10–97.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Stoppage in pressure line	Clean or replace hose and fittings. (Refer to paragraphs 10–95 and 10–97.)
	Leak in spring, tip, and socket	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer fails to return to 0	Stoppage in pressure line	Clean or replace hose and fittings. (Refer to paragraphs 10–95 and 10–97.)
	Loose link screw	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
Erratic pointer motion	Pointer contacting dial or glass	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Foreign matter in gear teeth	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Defective hairspring	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
Low reading	Leak in spring, tip, and socket	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Leak in pressure line or fitting	Pressure test line. Repair or replace pressure line or fittings. (Refer to paragraphs 10–95 and 10–97.)
	Loose pointer	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Pointer set low	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
High reading	Loose pointer	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
	Pointer set high	Replace indicator. (Refer to paragraph 10–8*a* and *b*.)
	Pointer shifted due to fatigue in Bourdon tube	Replace pressure transmitter. (Refer to paragraphs 10–95 and 10–97.)
Excessive pointer oscillation	Loose mounting	Tighten mounting screws at indicator and pressure transmitter.
	Loose pointer	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Insufficient hairspring tension	Replace oil pressure indicator. (Refer to paragraph 10–8*a* and *b*.)

10–94. Operational Check. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. On overhead control panel, remove and inspect XMSN OIL PRESS fuse and replace if defective. Reinstall fuse.

c. Engage all inverter circuit breakers, place inverter switch in FLT MAIN position, and connect external power source. Main transmission oil pressure indicator should read 0 psi.

d. Start engine and engage main rotor in accordance with TM 55-1520-202-10, observing main transmis-

sion oil pressure indicator as main rotor is engaged. Oil pressure indication should rise to a stable indication of 40 to 90 psi within 30 seconds after main rotor is engaged.

Warning

Engine operation will be performed by authorized personnel only.

Caution

If main transmission oil pressure does not rise to a minimum of 40 psi within 30 seconds after engaging main rotor, disengage main rotor to prevent possible damage to main transmission due to lack of proper oil pressure.

e. Shut down engine in accordance with TM 55-1520-202-10. With main rotor inoperative, main transmission oil pressure indicator should show a reading of 0 psi.

f. Disconnect external power source.

10–95. Removal. *a.* Remove main transmission oil pressure indicator in accordance with paragraph 10–8*a*.

b. Hinge down left service platform.

c. Provide a suitable container for spilled oil and a suitable plug for tee at oil inlet port.

d. Disconnect hose from tee at oil inlet port of main transmission and from transmitter. Plug tee in main transmission. Release clamps and remove hose.

e. Remove disconnect plug from transmitter. Release springs from adapter and remove bolts, washers, and nuts which secure adapter to support assembly. Remove transmitter and adapter.

f. Remove screws which secure transmitter to adapter.

g. Remove union and gasket from transmitter.

h. Remove screws and washers which secure support assembly to transmission deck and remove support assembly.

10–96. Inspection. *a.* Inspect main transmission oil pressure indicator case and glass for excessive dents or cracks.

b. Inspect electrical connector on indicator case and transmitter for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect temperature bulb for stripped threads, dents, and cracks.

10–97. Installation. *a.* Position support assembly on transmission deck. Line up holes and install screws and washers.

b. Install union and gasket in transmitter and secure transmitter to adapter with screws and washers.

c. Position adapter and transmitter on support assembly and secure them with bolts, washers, and nuts. Connect springs to adapter.

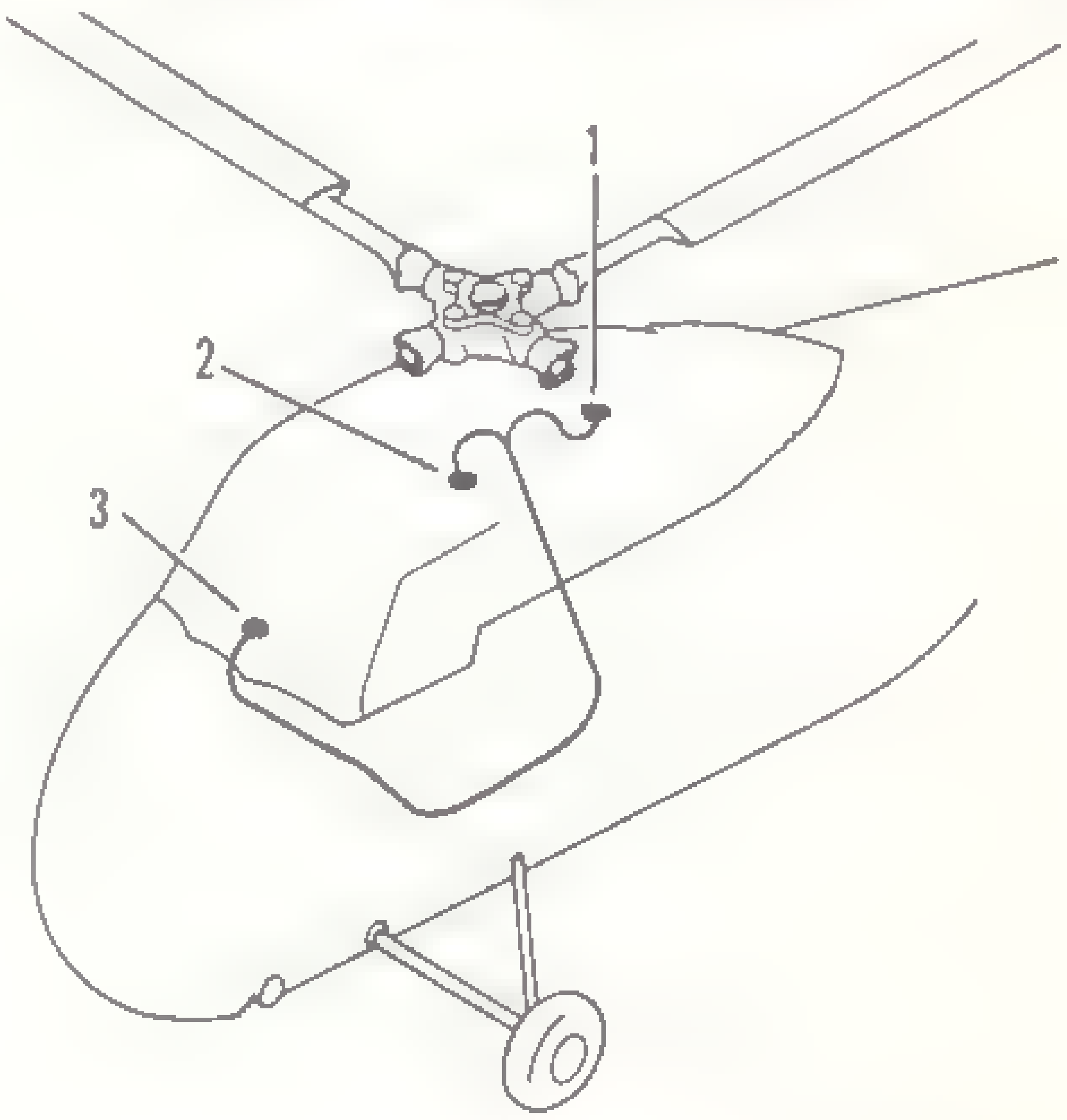
d. Connect wiring to transmitter and secure connection with lock wire.

e. Remove plug and connect hose to tee at gear box and to transmitter. Clamp hose to rear left support assembly.

f. Close service platform.

g. Install main transmission oil pressure indicator in accordance with paragraph 10–8*b*.

10–98. Main Transmission Oil Pressure Warning System. The main transmission oil pressure warning system (figure 10–17) indicates visually by means of a red TRANS. OIL PRESS LOW warning light that the oil pressure of the main transmission has fallen below a range of 8 to 10 psi. The system incorporates a main transmission oil pressure warning light (3), mounted to the left of the transmission oil pressure gage on the instrument panel, a main oil pressure switch (1), mounted on the forward left support assembly for the main transmission, wiring from the light to the switch, and pressure hose from the switch to the main transmission. The warning light is



1. Main Transmission Oil Pressure Switch
2. Warning Light Dimming Relay
3. Main Transmission Oil Pressure Warning Light

Figure 10–17. Main transmission oil pressure warning system

the press-to-test type. Power for the system is provided from the primary bus through the warning light dimming relay (2).

10—99. Troubleshooting. For troubleshooting procedures for the main transmission oil pressure warning system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Indicator does not light under conditions of low oil pressure	Defective lamp or receptacle	Replace lamp or receptacle, as indicated. (Refer to paragraphs 10—101 and 10—103.)
	Defective wiring from pressure switch	Make continuity check, and repair or replace wiring.
	Clogged or defective pressure hose or elbow	Clean line or elbow. Replace if indicated. (Refer to paragraphs 10—101 and 10—103.)
	Defective pressure switch	Replace pressure switch. (Refer to paragraphs 10—101 and 10—103.)
Indicator remains lighted under normal oil pressure condition.	Grounded wiring from lamp to pressure switch	Make continuity check, and repair or replace wiring.
	Leaking or defective pressure hose or elbow	Clean line or elbow. Replace if indicated. (Refer to paragraphs 10—101 and 10—103.)
	Defective pressure switch	Replace pressure switch. (Refer to paragraphs 10—101 and 10—103.)

10—100. Operational Check. a. Engage NON FLT INST circuit breaker on overhead control panel and place WARN LTS control in BRT position.

b. Connect external power source with main rotor inoperative. Main transmission oil pressure warning light should come on.

c. Start engine in accordance with TM 55-1520-202-10.

Warning

Operation of engine will be performed by authorized personnel only.

d. Observe main transmission oil pressure indicator and warning light while engaging main rotor. As indicator passes through range of 8 to 10 psi, warning light should go out and remain out through normal operating pressure.

e. Shut down engine in accordance with TM 55-1520-202-10 and observe warning light and main transmission oil pressure indicator. Warning light should come on as indicator falls through range of 8 to 10 psi.

f. Disconnect external power source.

10—101. Removal. a. Remove main transmission oil pressure warning light in accordance with paragraph 12—35*a*.

b. Hinge down left service platform.

c. Disconnect wiring at pressure switch mounted on forward left transmission support assembly.

d. Disconnect hose from fitting at top of main transmission and at pressure switch. Remove hose.

e. Release clamp securing pressure switch to support assembly and remove pressure switch.

10—102. Inspection. a. Inspect warning light for cracked lens, malformed threads, and damaged terminals.

b. Inspect pressure switch for elongated mounting holes and malformed threads. Inspect for damaged terminals.

10—103. Installation. a. Position pressure switch on forward left transmission support assembly and tighten mounting clamp.

b. Install hose and connect to fitting on main transmission and to pressure switch.

c. Connect wiring to pressure switch.

d. Close and lock left service platform.

e. Connect wiring to rear of warning light.

f. Install main transmission oil pressure warning light in accordance with paragraph 12—35*c*.

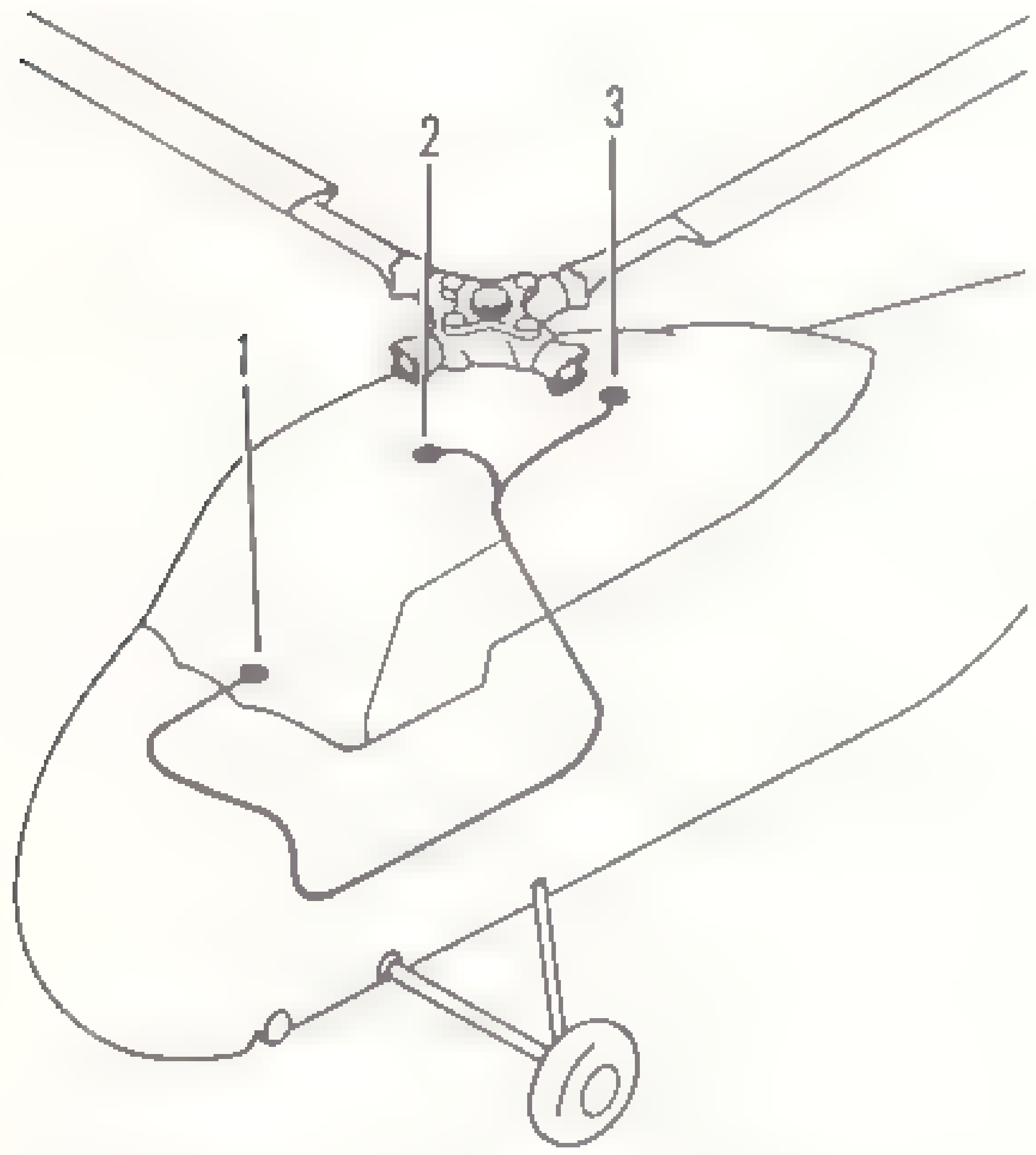
10—104. Main Transmission Oil Temperature Indicating System. The main transmission oil

temperature indicating system (figure 10–18) consists of an electrical resistance main transmission oil temperature bulb (3), located in the bottom of the main transmission lower housing, and a main transmission oil temperature indicator (1), located on the center of the instrument panel. Power for the system is provided from the primary bus through a circuit breaker (2) on the overhead control panel.

10–105. Troubleshooting. For troubleshooting procedures for the main transmission oil temperature indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer fails to respond	Power source	Check power source.
	Ground in bulb wiring	Repair or replace wiring.
	Defective bulb	Replace bulb. (Refer to paragraphs 10–107 and 10–109.)
	Defective oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer goes off high end of scale	Broken ground wire	Repair or replace wire.
	Defective bulb	Replace bulb. (Refer to paragraphs 10–107 and 10–109.)
	Defective oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer hard to left of scale	Short circuit in wiring to resistance bulb	Repair or replace wiring.
	Ground in wiring from bulb to indicator	Make continuity check and repair or replace wiring.
	Short circuit in bulb	Replace bulb. (Refer to paragraphs 10–107 and 10–109.)
	Open or short circuit in oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer hard to right of scale	Break in wiring to resistance bulb	Repair or replace wiring.
	Open circuit in resistance bulb	Replace bulb. (Refer to paragraphs 10–107 and 10–109.)
	Open or short circuit in oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer remains stationary off scale	Break in wiring	Repair or replace wiring.
	Poor ground at panel	Check indicator ground lead with ohmmeter and correct condition.
	Open or short circuit in oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)
Indicator operates intermittently	Defective battery master switch	Replace switch.
	Loose or broken battery or ground jumper	Repair, replace, or tighten lead or jumper.
	Defective bulb	Replace bulb. (Refer to paragraphs 10–107 and 10–109.)
	Defective oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive pointer oscillation	Loose or broken lead on jumper	Repair, replace, or tighten lead or jumper.
	Defective bulb	Replace bulb. (Refer to paragraphs 10–107 and 10–109.)
	Defective oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)
Obviously incorrect temperature reading	Defective bulb	Replace bulb. (Refer to paragraphs 10–107 and 10–109.)
Pointer fails to go off scale with current off	Defective oil temperature indicator	Replace oil temperature indicator. (Refer to paragraph 10–8*a* and *b*.)



1. Main Transmission Oil Temperature Indicator
2. Circuit Breaker
3. Main Transmission Oil Temperature Bulb

Figure 10–18. Main transmission oil temperature indicating system

10–106. Operational Check. a. Place battery and generator switches in OFF position and make sure external power is disconnected. Main transmission oil temperature indicator should read off scale on low end.

b. Engage XMSN OIL TEMP circuit breaker and connect external power source. With main transmission cold and inoperative, indicator should show a stable indication equal to ambient temperature.

Note

If helicopter has been parked in direct sunlight, indicated temperature may be somewhat higher than ambient temperature due to heating effect of direct sunlight.

c. Disconnect external power source.

d. Start engine and engage main rotor in accordance with TM 55-1520-202-10. With main transmission warm and operating normally, indicator should show stable indication within normal operating range of main transmission.

Warning

Engine operation will be performed by authorized personnel only.

e. Disconnect external power source and shut down engine in accordance with TM 55-1520-202-10. With all power off, indicator should read off scale on low end.

10–107. Removal. a. Remove main transmission oil temperature indicator in accordance with paragraph 10–8*a*.

b. Unsnap and remove cover from access hole in cabin ceiling.

c. Drain main transmission in accordance with instructions contained in paragraph 1–60.

d. By means of access hole in ceiling, remove disconnect plug from rear of temperature bulb.

e. Remove temperature bulb and gasket from oil strainer.

10–108. Inspection. a. Inspect main transmission oil temperature indicator case and glass for excessive dents or cracks.

b. Inspect electrical connectors at rear of indicator case and temperature bulb for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect temperature bulb for stripped threads, dents, and cracks.

10–109. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Install temperature bulb with new gasket in oil strainer.

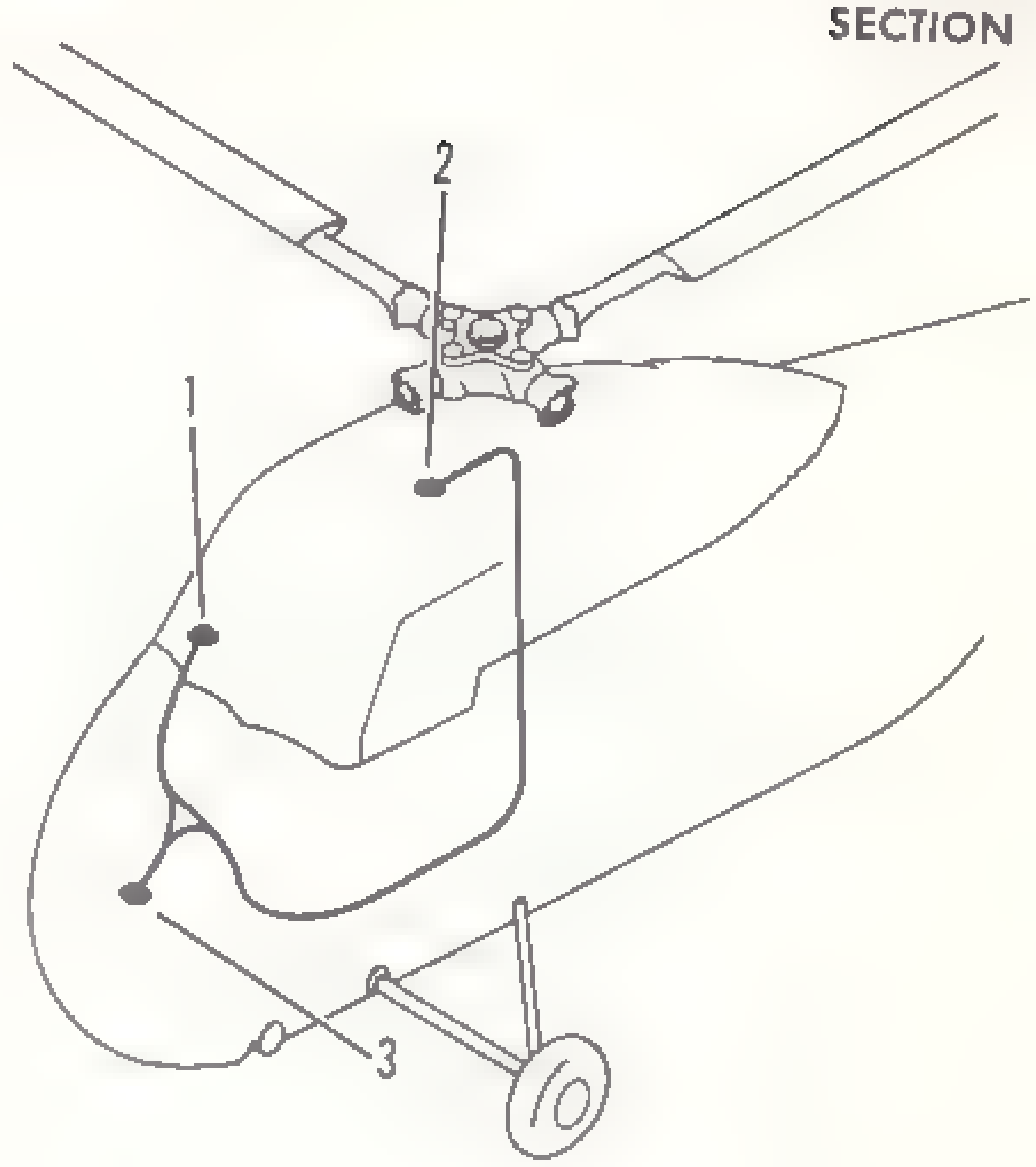
c. Install disconnect plug to rear of temperature bulb.

d. Fill main transmission in accordance with paragraph 1–60.

e. Replace cover to access hole in cabin ceiling.

f. Install main transmission oil temperature indicator in accordance with paragraph 10–8*b*.

10–110. Fuel Pressure Indicating System. The fuel pressure indicating system (figure 10–19) consists of a fuel pressure switch (3), located in the engine compartment, and a fuel pressure indicator (1), located on the instrument panel. The system provides the pilot and copilot with a continuous indication of fuel pressure available to the carburetor. Power for the system is derived from a fuse (2), located on the overhead control panel. The fuel pressure indicator (figures 10–1 through 10–3) consists of a case-mounted autosyn with an indicator needle attached to the rotor. The fuel pressure indicator is graduated in increments of 1 psi and has a range of 0 to 50 psi. The fuel pressure transmitter, mounted on a vibration-proof bracket on the right side of the engine compartment forward of the control bulkhead, is connected by tubing to the fuel intake of the carburetor. The fuel pressure transmitter consists of a Bourdon tube linked mechanically to an autosyn transmitter. Pressure variations cause the Bourdon tube to move. Motions of the Bourdon tube position the rotor of the autosyn. The autosyn located in the fuel pressure indicator aligns itself according to the position of the autosyn in the pressure transmitter.



1. Fuel Pressure Indicator
2. Fuse
3. Fuel Pressure Switch

Figure 10–19. Fuel pressure indicating system

10–111. Troubleshooting. For troubleshooting procedures for the fuel pressure indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer fails to register	Power failure	Check power source.
	Defective wiring	Check wiring for ground, shorts, and continuity.
	Leak in pressure lines	Tighten all connections. Repair or replace lines as necessary. (Refer to paragraphs 10–113 and 10–115.)
	Stoppage in lines	Clean lines.
	Defective fuel pressure indicator	Replace fuel pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Defective fuel pressure transmitter	Replace fuel pressure transmitter. (Refer to paragraphs 10–113 and 10–115.)
Pointer fails to return to zero	Stoppage in lines	Clean lines.
	Defective wiring	Check wiring for ground, shorts, and continuity.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Defective fuel pressure indicator	Replace fuel pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Defective fuel pressure transmitter	Replace fuel pressure transmitter. (Refer to paragraphs 10–113 and 10–115.)
Obviously incorrect pressure reading	Leak in pressure lines	Tighten connections and repair or replace lines as necessary. (Refer to paragraphs 10–113 and 10–115.)
	Kink in pressure line	Replace line. (Refer to paragraphs 10–113 and 10–115)
	Improper power supply	Check power source.
	Defective fuel pressure indicator	Replace fuel pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Defective fuel pressure transmitter	Replace fuel pressure transmitter. (Refer to paragraphs 10–113 and 10–115)
Excessive pointer oscillation	Loose mounting of indicator or transmitter	Tighten mounting screws.
	Defective vibration isolators or transmitter support	Replace isolators. (Refer to paragraphs 10–113 and 10–115.)
	Defective wiring	Check wiring for shorts and ground.
	Defective fuel pressure indicator	Replace fuel pressure indicator. (Refer to paragraphs 10–113 and 10–115.)
	Defective fuel pressure transmitter	Replace fuel pressure transmitter. (Refer to paragraphs 10–113 and 10–115.)

10–112. Operational Check. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove and inspect FUEL QTY fuse, located on the overhead control panel. Replace fuse if defective and reinstall.

c. Place INST INV switch in FLT MAIN position and connect external power source. Fuel pressure indicator should give stable indication of 0 psi.

d. Start engine in accordance with TM 55-1520-202-10. Fuel pressure indicator should show stable indication within normal operating pressure of system.

Warning

Engine operation will be performed by authorized personnel only.

e. Shut down engine in accordance with TM 55-1520-202-10 and disconnect external power source.

10–113. Removal. a. Remove fuel pressure indicator in accordance with paragraph 10–8*a*.

b. Open engine access doors.

c. Disconnect fuel pressure hose from coupling on disconnect panel and from tee fitting on pressure transmitter and remove hose.

d. Disconnect oil dilution line from tee fitting at transmitter.

e. Disconnect electrical wiring to transmitter at disconnect plug.

f. Remove screws, washers, and nuts that secure transmitter to mounting bracket and remove transmitter.

g. Remove tee fitting from transmitter.

10–114. Inspection. a. Inspect fuel pressure indicator (9, figure 10–3) case and glass for excessive dents or cracks.

b. Inspect electrical connectors at rear of indicator case and transmitter for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect transmitter for stripped threads, dents, and cracks.

10–115. Installation. a. Place battery and generator, switches in OFF position and make sure external power is disconnected.

b. Install tee fitting to pressure transmitter.

c. Install pressure transmitter to mounting bracket and secure with screws, washers, and nuts.

d. Install electrical disconnect plug to pressure transmitter. Secure plug with lock wire.

e. Install oil dilution line to tee at pressure transmitter.

f. Install fuel pressure hose to coupling on disconnect panel and to tee fitting on pressure transmitter.

g. With fuel booster pump operating, check system for fuel leaks.

h. Close engine access doors.

i. Install fuel pressure indicator in accordance with paragraph 10–8*b*.

10–116. Fuel Quantity Indicator. The fuel quantity indicator (figures 10–1 through 10–3), located on the instrument panel, provides the pilot and copilot with a continuous indication of fuel quantity in any or all fuel tanks, depending on the position of the fuel quantity selector switch. Effective capacity of the probes located in the fuel tanks changes in proportion to the quantity of fuel present. Changes in capacity unbalance a bridge circuit in the system, causing operation of a motor in the indicator. The rotor of the motor is connected to the indicator needle and to a potentiometer which is part of the bridge circuit. Rotor rotation is in the proper direction to restore balance to the bridge circuit by varying the potentiometer. When the bridge circuit is balanced, no current flows in the motor and it is inoperative. Range of the indicator is 0 to 1800 pounds of fuel.

10–117. Removal. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove studs from sides of instrument panel cowl, unlock metal fasteners at top of cowl, and remove instrument panel cowl.

c. Remove shielded connector plug and electrical disconnect plug from rear of indicator.

d. On front of instrument panel, loosen clamp holding indicator by unscrewing jackscrew located at lower right of indicator.

e. Remove indicator from front of panel.

Warning

Do not disturb setting of zero adjustment if indicator is to be reinstalled.

10–118. Inspection. a. Inspect fuel quantity indicator case and glass for excessive dents or cracks.

b. Inspect electrical connectors at rear of indicator case for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

10–119. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Install indicator in proper position from front of instrument panel.

c. Actuate clamp by tightening jackscrew located at lower right of indicator until indicator is secure.

d. Install electrical disconnect plug and shielded connector plug to rear indicator and secure with lock wire.

e. Position instrument panel cowl in proper position on instrument panel and secure with metal fasteners and studs.

10–120. Fuel Quantity Selector Switch. The fuel quantity selector switch (figures 10–1 through 10–3), located on the instrument panel, makes it possible for the pilot or copilot to have ready indications of fuel remaining in any or all fuel tanks. The fuel quantity selector switch has four positions marked TOT, FWD, CTR, and AFT, which electrically connect the probes of each fuel tank to the circuit.

10–121. Removal. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. From beneath instrument panel, remove shielded connector plug and electrical disconnect plug from rear of fuel quantity selector switch.

c. On front of instrument panel, loosen clamp holding indicator by unscrewing jackscrew located at lower right of selector switch.

d. Remove selector switch from front of panel.

10–122. Inspection. a. Inspect selector switch case for cracks or dents.

b. Inspect connector at rear of switch for bent or damaged pins and corrosion.

10–123. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Install selector switch through opening at front of instrument panel.

c. Actuate clamp by tightening jackscrew at lower right of indicator until indicator is secure.

d. Install electrical disconnect plug and shielded connector plug to rear of selector switch from beneath instrument panel. Secure plugs with lock wire.

10–124. Fuel Quantity Indicator Test Switch.

The fuel quantity indicator test switch (figures 10–1 through 10–3), located on the instrument panel, is a normally closed pushbutton switch. Operating the pushbutton opens the signal circuit, allowing the indicator needle to fall toward 0 if the indicator is operating properly.

10–125. Removal. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove cowl assembly from instrument panel by removing studs and unfastening fasteners.

c. From front of instrument panel, remove attaching hardware securing fuel quantity indicator test switch to instrument panel and remove switch from rear of instrument panel.

d. Tag and disconnect wiring from rear of switch and remove switch.

10–126. Inspection. a. Inspect terminals for damage and corrosion.

b. Inspect switch for stripped threads.

10–127. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Using proper electrical wiring diagram for reference, install wiring to rear of fuel quantity indicator test switch.

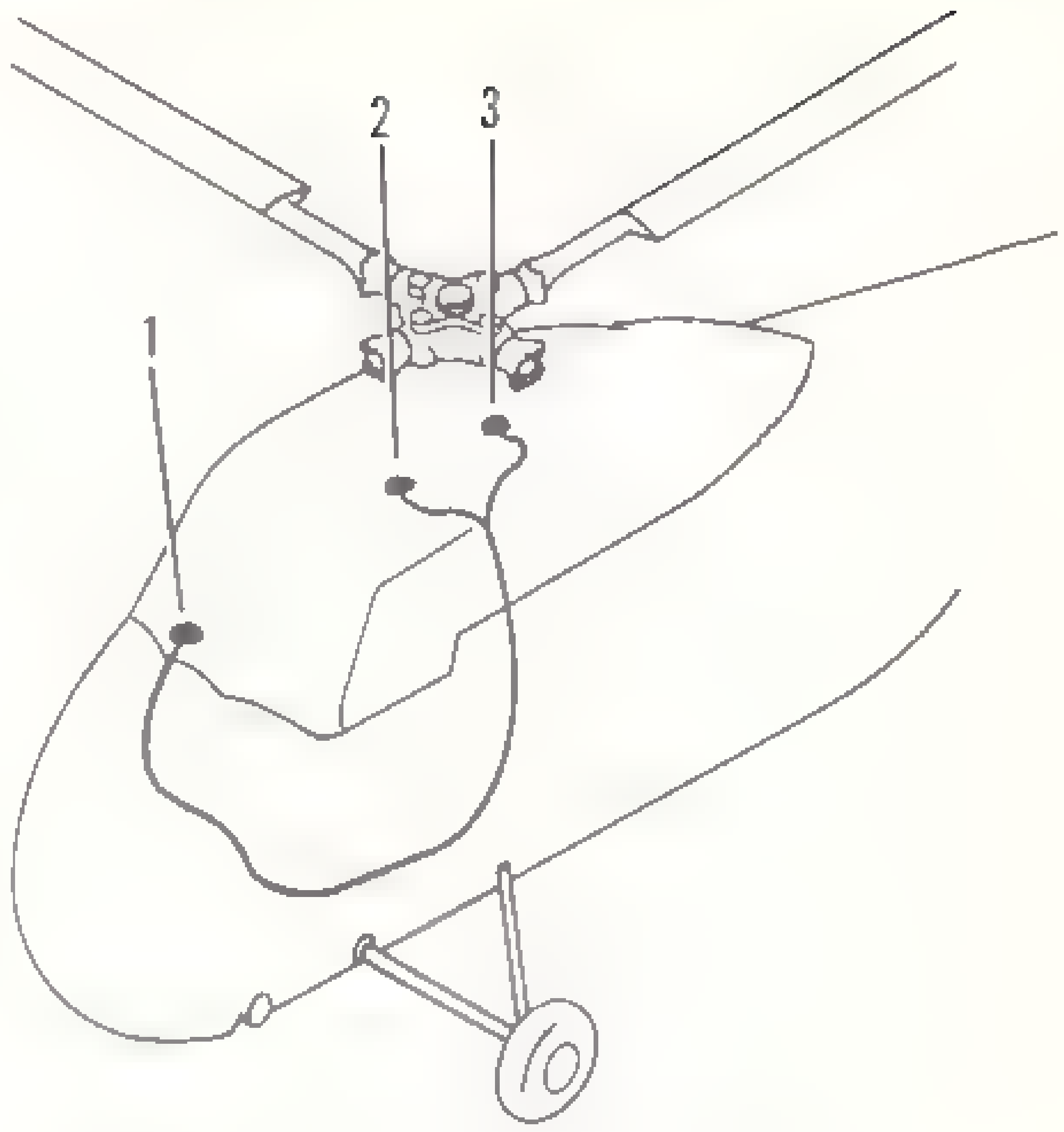
c. From rear of instrument panel, install switch in proper position.

d. From front of instrument panel, secure switch with attaching hardware.

e. Install cowl assembly on instrument panel and secure with fasteners.

10–128. Primary Hydraulic Pressure Indicating System.

The primary hydraulic pressure indicating system (figure 10–20) consists of the primary hydraulic pressure indicator (1), located on the instrument panel, and the primary hydraulic pressure transmitter (3), located forward of the hydraulic panel in the main transmission deck. Power for the system is supplied through a fuse (2) on the overhead control panel marked HYD PRESS-PRI. The primary hydraulic pressure indicator (figures 10–1 through 10–3) provides the pilot and copilot with a continuous indication of pressure in the primary hydraulic system. The indicator consists of an autosyn with an indicator needle attached to the rotor. The autosyn rotor follows the position of a corresponding rotor in the pressure transmitter. The primary hydraulic pressure indicator is graduated in increments of 100 psi and has a range of 0 to 4000 psi. The hydraulic pressure transmitter is connected by pressure hose to the primary hydraulic system and by electrical wiring to the primary hydraulic pressure indicator. The pressure transmitter consists of a Bourdon tube connected by mechanical linkage to the rotor of an autosyn. Changes of pressure in the primary hydraulic system cause the Bourdon tube to move. This motion is transmitted mechanically to the autosyn rotor in the transmitter and electrically to the autosyn in the indicator.



1. Primary Hydraulic Pressure Indicator
2. Fuse
3. Primary Hydraulic Pressure Transmitter

Figure 10–20. Primary hydraulic pressure indicating system

10–129. Troubleshooting. For troubleshooting procedures for the primary hydraulic pressure indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer fails to register	Leak in pressure line	Repair or replace tubing or fittings. (Refer to paragraphs 10–131 and 10–133.)
	Stoppage in pressure line	Clean tubing and nipples.
	Defective hydraulic pressure indicator	Replace hydraulic pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
Pointer fails to return to zero	Stoppage in pressure line	Clean tubing and fittings. (Refer to paragraphs 10–131 and 10–133.)
	Defective hydraulic pressure indicator	Replace hydraulic pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
Obviously incorrect pressure reading	Leak in pressure line	Repair or replace tubing or fittings. (Refer to paragraphs 10–131 and 10–133.)
	Defective hydraulic pressure indicator	Replace hydraulic pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Defective hydraulic pressure transmitter	Replace hydraulic pressure transmitter. (Refer to paragraphs 10–131 and 10–133.)
Excessive pointer oscillation	Loose mounting	Tighten mounting screws at transmitter and indicator.
	Defective hydraulic pressure indicator	Replace hydraulic pressure indicator. (Refer to paragraph 10–8*a* and *b*.)
	Air in pressure line	Bleed pressure line. (Refer to paragraph 6–8.)
Sluggish oil pressure reading	Sludge or heavy oil in line	Bleed pressure line. (Refer to paragraph 6–8.)

10–130. Operational Check. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove and inspect HYD PRESS-PRI fuse, located on overhead control panel. Replace fuse if defective and reinstall.

c. Connect external power source.

d. Engage INVERTER circuit breakers and place inverter switch in FLT MAIN position. Place SERVO switch in AUX OFF position. With engine and main rotor inoperative, primary hydraulic pressure indicator should show a stable indication of 0 psi.

e. Start engine and engage main rotor in accordance with TM 55-1520-202-10. Disconnect external power.

Warning

Operation of engine will be performed by authorized personnel only.

f. With engine and main rotor operating normally, primary hydraulic indicator should show a stable indication within normal operating range of system.

g. Shut down engine in accordance with TM 55-1520-202-10.

10–131. Removal. Remove primary hydraulic pressure indicator in accordance with paragraph 10–8*a*. Remove pressure transmitter in accordance with paragraph 6–15*a*.

10–132. Inspection. a. Inspect primary hydraulic pressure indicator case and glass for excessive dents or cracks.

b. Inspect electrical connectors at rear of indicator and transmitter case for bent pins, damaged threads, corrosion, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

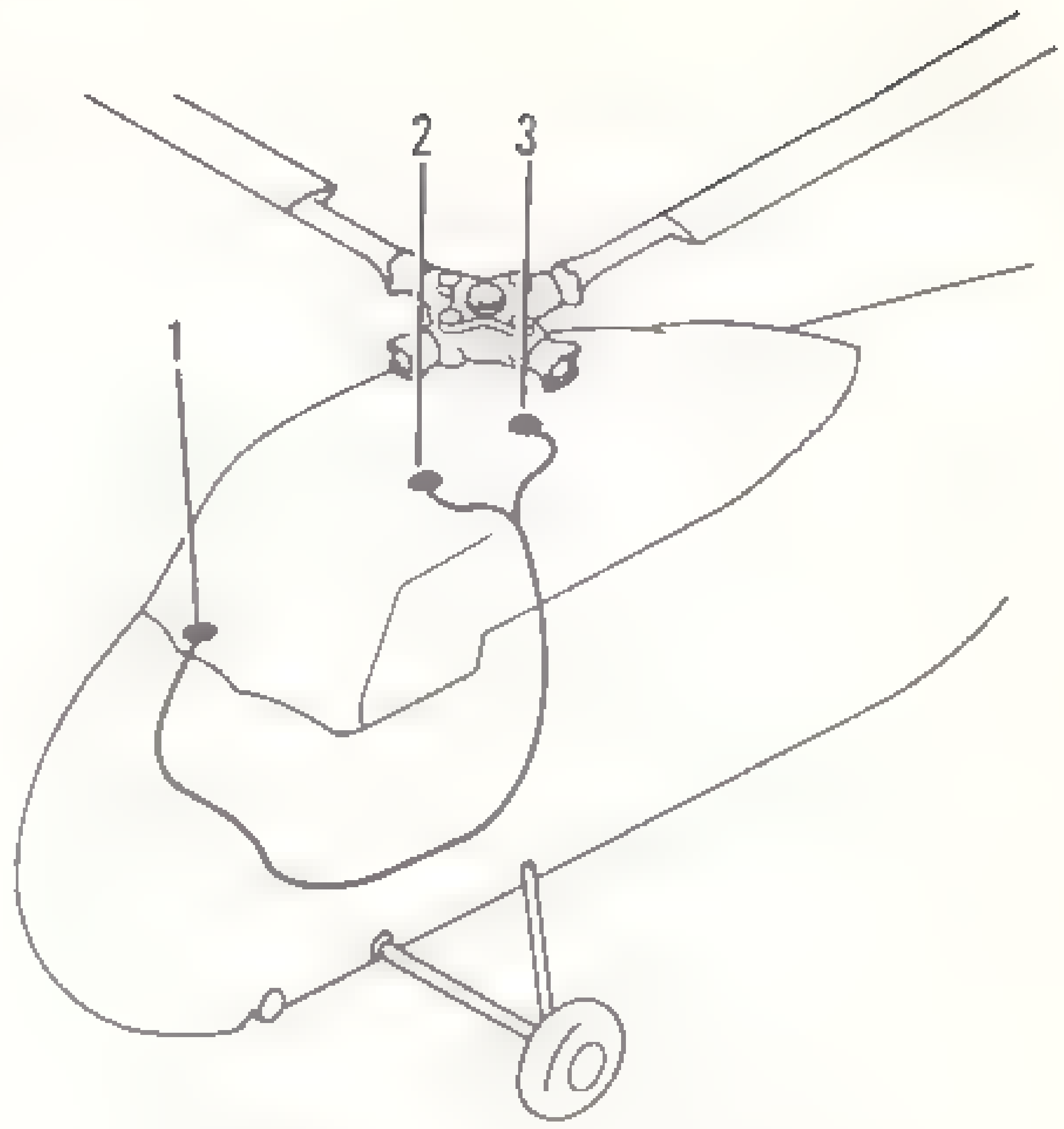
d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

10–133. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Install pressure transmitter in accordance with paragraph 6—15*d*.

c. Install primary hydraulic pressure indicator in accordance with paragraph 10—8*b*.

10—134. Auxiliary Hydraulic Pressure Indicating System. The auxiliary hydraulic pressure indicating system (figure 10—21) consists of the auxiliary hydraulic pressure indicator (1), located on the instrument panel, and the auxiliary hydraulic pressure transmitter (3), located on the main transmission deck. Power for the system is supplied through a fuse (2), located on the overhead control panel marked HYD PRESS-AUX. The auxiliary hydraulic pressure indicator (figures 10—1 through 10—3) provides the pilot and copilot with a continuous indication of pressure in the auxiliary hydraulic system. The indicator consists of an autosyn with an indicator needle attached to the rotor. The autosyn rotor follows the position of a corresponding rotor in the pressure transmitter. The auxiliary hydraulic pressure indicator is graduated in increments of 100 psi and has a range of 0 to 4000 psi. The auxiliary hydraulic pressure transmitter is connected by pressure hose to the auxiliary hydraulic system and by electrical wiring to the auxiliary hydraulic pressure indicator. The pressure transmitter consists of a Bourdon tube connected by mechanical linkage to the rotor of an autosyn. Changes of pressure in the auxiliary hydraulic system cause the Bourdon tube to move. This motion is transmitted mechanically to the autosyn rotor in the pressure transmitter and electrically to the autosyn in the indicator. The auxiliary hydraulic pressure transmitter is shock-mounted to a bracket located on the right side of the main transmission deck aft of the cockpit canopy bulkhead.



1. Auxiliary Hydraulic Pressure Indicator
2. Fuse
3. Auxiliary Hydraulic Pressure Transmitter.

Figure 10—21. Auxiliary hydraulic pressure indicating system

10—135. Troubleshooting. For troubleshooting procedures for the auxiliary hydraulic pressure indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer fails to register	Leak in pressure line	Repair or replace tubing or fittings
	Stoppage in pressure line	Clean tubing and fittings.
	Defective hydraulic pressure indicator	Replace hydraulic pressure indicator. (Refer to paragraph 10—8*a* and *b*.)
Pointer fails to return to zero	Stoppage in pressure line	Clean tubing and fittings.
	Defective hydraulic pressure indicator	Replace hydraulic pressure indicator. (Refer to paragraph 10—8*a* and *b*.)
Obviously incorrect pressure reading	Leak in pressure line	Repair or replace tubing or fittings.
	Defective hydraulic pressure indicator	Replace hydraulic pressure indicator. (Refer to paragraph 10 8*a* and *b*.)
	Defective hydraulic pressure transmitter	Replace hydraulic pressure transmitter. (Refer to paragraphs 10—137 and 10—139.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive pointer oscillation	Loose mounting	Tighten mounting screws at transmitter and indicator
	Defective hydraulic pressure indicator	Replace indicator. (Refer to paragraphs 10–8*a* and *b*.)
	Air in pressure line	Bleed pressure line. (Refer to paragraph 6–19)
Sluggish oil pressure reading	Sludge or heavy oil in line	Bleed pressure line. (Refer to paragraph 6–19.)

10–136. Operational Check. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove and inspect HYD PRESS-AUX fuse on overhead control panel. Replace fuse if defective and reinstall.

c. Connect external power source.

d. Engage INVERTER circuit breakers and place inverter switch in FLT MAIN position. Place SERVO switch in PRI OFF position. With engine inoperative, auxiliary hydraulic pressure indicator should show a stable indication of 0 psi.

e. Start engine in accordance with TM 55-1520-202-10. Disconnect external power.

Warning

Operation of engine will be performed by authorized personnel only.

f. With engine operating normally, auxiliary hydraulic indicator should show a stable indication within normal operating range of system.

g. Shut down engine in accordance with TM 55-1520-202-10.

10–137. Removal. a. Remove auxiliary hydraulic pressure indicator in accordance with paragraph 10–8*a*.

b. Remove pressure transmitter in accordance with paragraph 6–15*a*.

10–138. Inspection. a. Inspect auxiliary hydraulic pressure indicator case and glass for excessive dents or cracks.

b. Inspect electrical connectors at rear of indicator and pressure transmitter cases for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Make sure range markings are legible and in proper position. Refer to TM 55-1520-202-10 for proper range markings.

e. Inspect pressure transmitter for stripped threads, dents, and cracks.

10–139. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Install pressure transmitter in accordance with paragraph 6–15*d*.

c. Install auxiliary hydraulic pressure indicator in accordance with paragraph 10–8*b*.

10–140. Voltmeter. The voltmeter (figures 10–1 through 10–3) provides the pilot and copilot with a continuous indication of voltage on the primary bus. The voltmeter has a range of 0 to 30 volts in increments of 1 volt.

10–141. Troubleshooting. For troubleshooting procedures for the voltmeter, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
DC system components operating normally, no indication on voltmeter	Defective voltmeter wiring	Repair or replace wiring.
	Defective voltmeter	Replace voltmeter. (Refer to paragraphs 10–7*a* and *b*.)
Obviously incorrect voltmeter indication	Defective voltmeter	Replace voltmeter. (Refer to paragraphs 10–7*a* and *b*.)

10–142. Removal. Remove voltmeter in accordance with paragraph 10–7*a*.

10–143. Inspection. a. Inspect voltmeter case and glass for excessive dents or cracks.

b. Inspect electrical connector at rear of voltmeter case and temperature bulb for bent pins, corrosion, damaged threads, and signs of arcing.

c. Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

10–144. Installation. Install voltmeter in accordance with paragraph 10–7*b*.

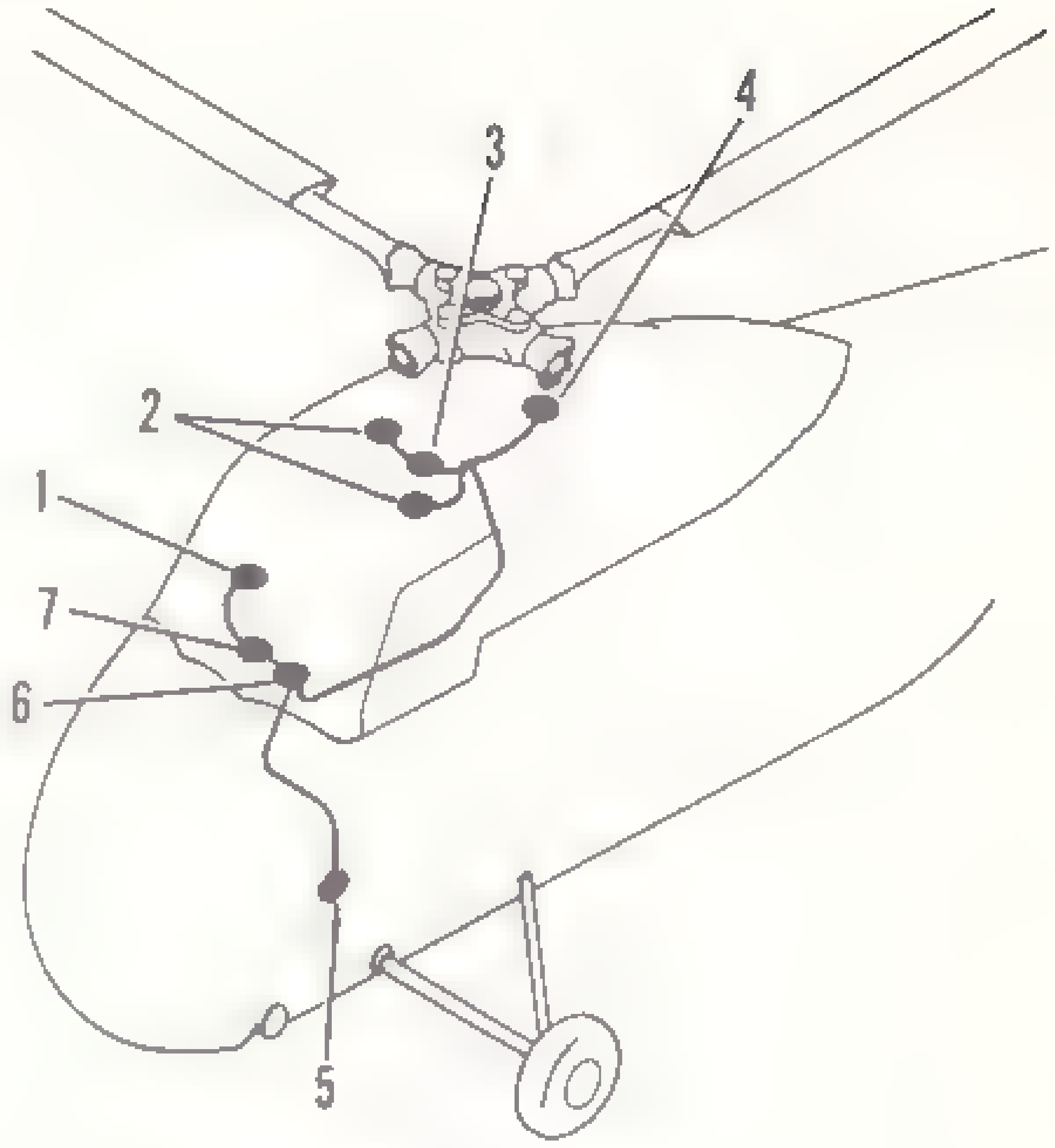
10–145. Ammeter (Loadmeter). The ammeter (figures 10–1 through 10–3), mounted on the instrument panel in front of the pilot, provides a continuous indication of the ratio between dc system load and generator output. The ammeter is calibrated as a loadmeter.

10–146. Removal. Remove ammeter in accordance with paragraph 10–7*a*.

10–147. Inspection. Inspect ammeter case and glass for dents and cracks. Inspect electrical terminals for damage and corrosion.

10–148. Installation. Install ammeter in accordance with paragraph 10–7*b*.

10–149. Rotor Brake Warning System (Helicopters Serial No. 55-4462 and Subsequent). The rotor brake warning system, (figure 10–22) consists of the rotor brake warning light (1) marked ROTOR BK ON, located on the left center of the main switch panel, and a pressure switch (4), located on the transmission deck. Hydraulic pressure in the rotor brake system actuates the switch and causes the warning light to come on when the rotor brake is engaged. The pressure switch also interrupts power available to the hydro-mechanical clutch system. Power for the system is supplied from the primary bus through circuit breakers.



1. *Rotor Brake Warning Light
2. Circuit Breaker
3. Interlock Relay
4. *Pressure Switch
5. Hydro-Mechanical Clutch Pump or Diverter Valve
6. Clutch Pump Switch
   Clutch Pump Warning Light

*Helicopter A Serial No. 55-4462 and Subsequent

Figure 10–22. Rotor brake and clutch pump warning system

10–150. Troubleshooting. For troubleshooting procedures for the rotor brake warning system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Warning light does not come on when rotor brake is engaged	Defective lamp	Replace lamp.
	Defective pressure switch	Replace pressure switch. (Refer to paragraphs 10–152 and 10–154.)
	Defective lamp receptacle	Replace lamp receptacle. (Refer to paragraphs 10–152 and 10–154.)
	Break in wiring	Repair or replace wiring.
Warning light remains on with rotor brake disengaged	Defective pressure switch	Replace pressure switch. (Refer to paragraphs 10–152 and 10–154.)

10–151. Operational Check. a. Connect external power source and engage WARN LTS and CLUTCH circuit breakers on overhead control panel. With rotor brake engaged, ROTOR BK ON warning light should come on.

b. Release rotor brake. ROTOR BK ON warning light should go off.

c. Engage rotor brake and start engine in accordance with TM 55-1520-202-10.

Warning

Operation of engine will be performed by authorized personnel only.

d. With engine operating at idle speed, place clutch pump switch momentarily in clutch position. Hydro-mechanical clutch should remain inoperative and associated warning light should not come on.

Caution

If hydro-mechanical clutch warning light comes on, disengage hydro-mechanical clutch or rotor brake immediately to prevent possible damage to rotor brake shoes or disc.

e. Place hydro-mechanical clutch pump switch in OFF position and disengage rotor brake.

f. Engage main rotor in accordance with TM 55-1520-202-10.

g. Hydro-mechanical clutch and associated warning light should operate normally during clutch engagement operation.

h. Disconnect external power source and shut down engine in accordance with TM 55-1520-202-10.

10–152. Removal. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove studs and unlock metal fasteners. Remove instrument panel cowl.

c. At rear of main switch panel (3, figure 10–1; 4, figure 10–2; or 5, figure 10–3), remove wiring from rear of ROTOR BK ON warning light.

d. Remove ROTOR BK ON warning light from front of instrument panel.

e. Hinge down left service platform.

f. Remove electrical disconnect plug from pressure switch.

g. Refer to paragraph 6–47 or 6–48 and bleed rotor brake system pressure at accumulator.

h. Disconnect flexible hose from pressure switch.

i. Remove attaching bolts and washers and remove pressure switch from mounting bracket.

j. Disconnect flexible hose from elbow.

10–153. Inspection. a. Inspect warning light for malformed threads, damaged terminals, and cracked lens.

b. Inspect pressure switch for damaged fittings, stripped threads, and elongated mounting holes.

10–154. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Install pressure switch to mounting bracket with bolts and washers.

c. Install flexible hose to pressure switch and tighten securely.

d. Fill flexible hose with hydraulic fluid to prevent introducing excess air to system.

Caution

Do not allow spilled hydraulic fluid to come in contact with electrical disconnect plug or socket on switch.

e. Install flexible hose to elbow.

f. Install electrical disconnect plug to pressure switch. Secure plug with lock wire.

g. Close and lock service platform.

h. In flight compartment, install warning light from front of main switch panel and secure with attaching hardware.

i. Using appropriate wiring diagram for reference, install wiring to rear of warning light.

j. Install cowl to instrument panel with studs and metal fasteners.

k. Fill and bleed rotor brake system as outlined in paragraph 6–47 or 6–48.

10–155. Hydro-Mechanical Clutch Warning System. The hydro-mechanical clutch warning system (figure 10–22) consists of the clutch pump warning light (7), mounted adjacent to the clutch pump switch (6) on the control console. The warning light is on when current is being supplied to the rotor clutch system. Power for the system is supplied from the primary bus through circuit breakers (2), located on the overhead control panel.

Note

On helicopters equipped with a rotor brake warning system (paragraph 10–149), a relay is is included in the circuit to interrupt power to the rotor clutch system when the rotor brake is on, preventing the hydro-mechanical clutch system from operating when the rotor brake is on.

10–156. Troubleshooting. For troubleshooting procedures for the hydro-mechanical clutch warning system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Hydro-mechanical clutch does not operate; clutch pump warning light does not come on	*Rotor brake on	Release rotor brake.
	*Defective pressure switch in rotor brake system	Replace pressure switch. (Refer to paragraphs 10–157 and 10–159.)
	Defective wiring to hydro-mechanical clutch system	Repair or replace wiring
*Hydro-mechanical clutch and warning light operate with rotor brake on	*Defective relay	Replace relay. (Refer to paragraphs 10–157 and 10–159.)
	*Defective pressure switch in rotor brake system	Replace pressure switch. (Refer to paragraphs 10–157 and 10–159)
	*Defective relay	Replace relay (Refer to paragraphs 10–157 and 10–159.)

*Helicopters serial No. 55-4462 and subsequent

10–157. Removal. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. On control console, remove attaching hardware and cover plate containing hydro-mechanical clutch pump switch and warning light.

c. At rear of cover plate, remove wiring from rear of switch and warning light.

d. Remove attaching hardware and warning light at rear of cover.

e. Remove attaching hardware and switch at front of cover.

Note

Following instructions apply to helicopters serial No. 55-4462 and subsequent.

f. Unlock metal fasteners and hinge down overhead control panel.

g. Remove wiring from rotor brake interlock relay. Remove attaching hardware and relay.

10–158. Inspection. a. Inspect warning light for malformed threads, damaged terminals, and cracked lens.

b. Inspect relay for damaged fittings, stripped threads, and elongated mounting holes.

10–159. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. At control console install switch from rear of cover plate and secure with attaching hardware.

c. Install warning light from front of cover plate and secure with attaching hardware.

d. Using appropriate wiring diagram for reference, install wiring to rear of switch and warning light.

e. Install cover plate to control console and secure with attaching hardware.

Note

Following instructions apply to helicopters serial No. 55-4462 and subsequent.

f. Install rotor brake interlock relay in overhead control panel and secure with attaching hardware.

g. Using appropriate wiring diagram for reference, install wiring to rotor brake interlock relay. Close overhead control panel and secure with metal fasteners.

10–160. Engine and Transmission Chip Detector Warning System. The engine chip detector warning system consists of an amber warning light marked ENG CHIP DET mounted on the instrument panel (figures 10–1, 10–2, and 10–3), a magnetic chip detector plug installed in the engine oil sump and in the supercharger housing, and the necessary wiring. The main transmission chip detector warning system consists of an amber warning light marked XMSN CHIP DET mounted on the instrument panel, a magnetic chip detector plug installed in the main transmission lower housing, and necessary wiring. Ferrous (iron or iron alloy) particles present in the oil are magnetically attracted to the magnetic chip detector plug and retained to prevent their further circulation in the lubricant. When a sufficient quantity of smaller particles or a large particle bridges the gap between the insulated portions and the body of the plug, an electrical circuit is established causing the warning light to come on. The warning light is of the press-to-test type.

Caution

When replacing bulb in chip detector warning light, use only lamps, P/N MS25237-327, or equivalent. Lamps of higher amperage rating may reduce the sensitivity of the chip detector.

10–161. Troubleshooting. For troubleshooting procedures for the engine and transmission chip detector warning system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Lamp does not come on when cover is pressed	Defective lamp	Replace lamp (MS25237-327 or equivalent only).
	No power in system	Check for power at warning light.
	Open ground at warning light	Inspect for loose or open ground connection.
Warning light on continually under normal conditions	Plug or wiring grounded	With power on, remove connector from disconnect plug. If light goes off, replace chip detector plug (paragraphs 10–163 and 10–165); if light remains on, inspect for grounded wiring.

10–162. Operational Check. a. Place battery and generator in OFF position and make sure external power is disconnected.

b. Remove chip detector magnetic plug.

c. Connect an external power source and engage warning lights circuit breaker.

d. Press down on cover of warning light. Warning light should come on.

e. Install electrical disconnect plug to chip detector plug. Using a jumper lead or other suitable means, connect threaded portion of chip detector plug to a good ground.

f. Observe chip detector warning light. Warning light should remain off.

g. Use a screwdriver or other metal object to bridge air gap on magnetic portion of chip detector plug. Warning light should come on.

h. Disconnect external power, remove jumper and electrical disconnect from chip detector plug, and install chip detector plug.

10–163. Removal. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Remove nut and lockwasher from rear of warning light and slide down onto wiring. Push warning light through front of instrument panel.

c. Remove wiring from rear of warning light and chip detector magnetic plugs.

d. Remove chip detector magnetic plugs.

10–164. Inspection. a. Inspect warning light for malformed threads, damaged terminals, and cracked lens.

b. Inspect chip detector plugs for malformed threads and terminal damage.

10–165. Installation. a. Place battery and generator switches in OFF position and make sure external power is disconnected.

b. Using appropriate wiring diagram for reference, install wiring to warning light.

c. Insert warning light through opening in instrument panel and secure with lockwasher and nut.

d. Perform operational check. (Refer to paragraph 10–162.)

CHAPTER 11

UTILITY SYSTEMS

Section I Scope

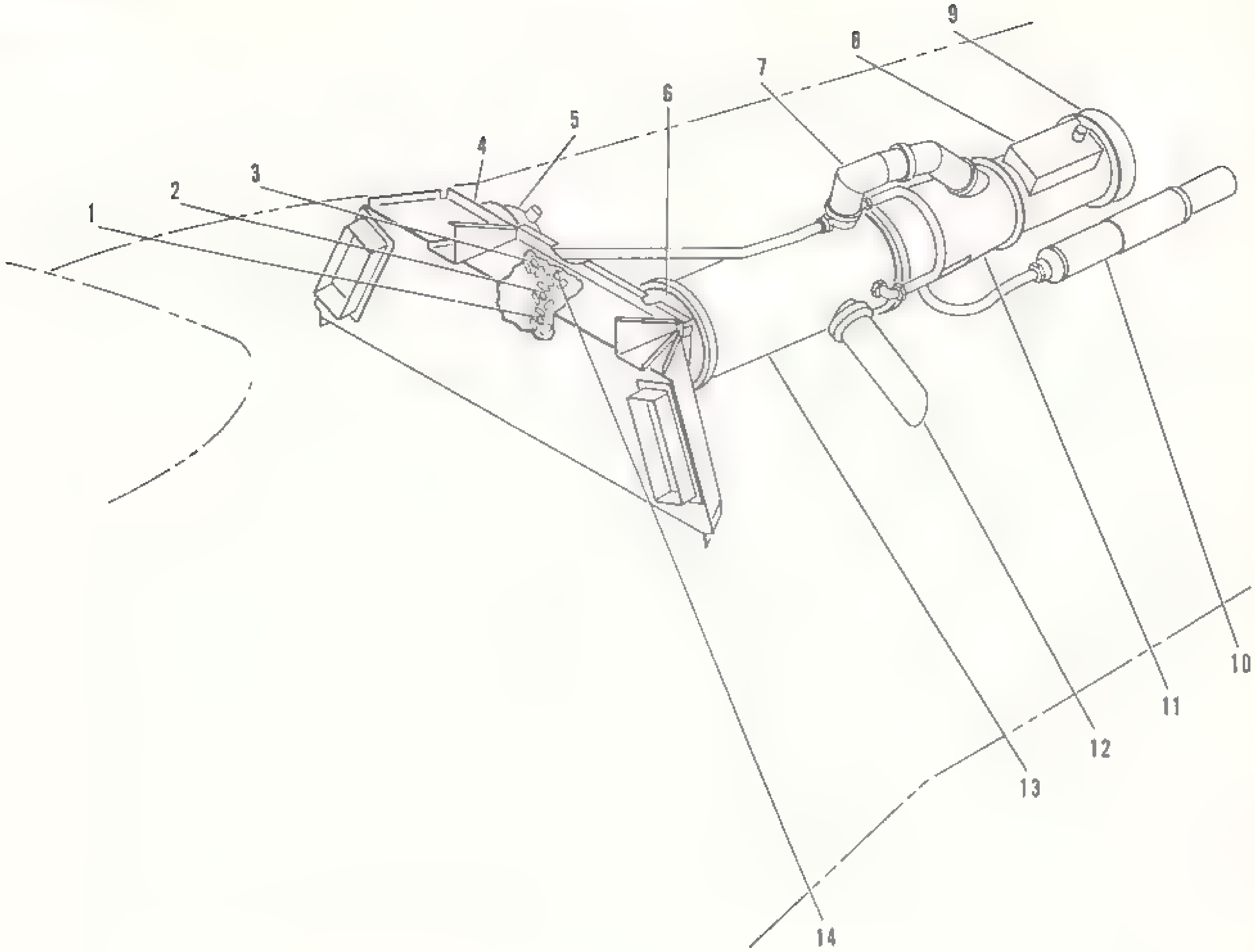
11–1. Purpose. The purpose of this Chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete utility systems.

11–2. Description. Utility systems are those systems within the helicopter not directly contributing to flight, but enabling the helicopter to perform certain specialized functions. The systems included in this category are the heating and ventilating systems, the fire detector system, the fire extinguisher system, and the windshield wiper system.

Section II Heating and Ventilating

11–3. Description. The cockpit and cabin are provided with heating and ventilating systems. The heating system consists of a heater with the necessary components and controls to regulate the temperature inside the cockpit and cabin to any desired setting. The heating controls are located in the cockpit. Fuel for the heating system is provided by an electrically-driven fuel pump. For ventilation, air enters the cockpit and cabin through ducts and anemostats, or registers.

11–4. Heating System. The heating system consists primarily of the following: A 50,000 BTU internal combustion heater (13, figure 11–1) and a plenum duct (4) located in the heater compartment; a flexible duct and damper assembly (helicopter serial No. prior to 56-4313), or elbow (7) (helicopter serial No. 56-4313 and subsequent), mounted on top of the heater and adapter; an ignition unit (10) and a blower (8) mounted just aft of the heater in the forward part of the tail cone; thermal switches (1, 2, and 3) mounted on the plenum duct (4); relays (12, figure 11–2) mounted on the rear bulkhead of the electronics compartment; cockpit ducts (4 and 22) and anemostats, or registers (3 and 24), to convey and distribute air from the heater to the cabin and cockpit; an engine preheat duct (23), when installed, supplies warm air to the carburetor during cold weather operation; and the heater fuel system to carry fuel from the forward fuel tank to the heater. Air is drawn into the blower from the tail cone through the air intake scoop attached to the aft end of the blower. From the blower, air passes through an adapter into the heating chamber of the heater and on into the plenum duct. From the plenum duct, (4, figure 11–1) air is distributed to the cabin and cockpit. The flexible duct and damper assembly or elbow (7) supplies air from the aft adapter (11) to the combustion chamber of the heater. The ignition unit (10) supplies the necessary spark to the heater spark plug to support combustion. An exhaust tube (12) from the combustion chamber of the heater extends through the left side of the helicopter. An air pressure switch (5), mounted on the right side of the plenum duct, prevents the heater from operating should there be an inadequate supply of air for combustion. The main heating ducts (18 and 19, figure 11–2) carry heated air from the plenum duct forward along each side of the cabin and cockpit and terminate at the defroster ducts. Eight controllable anemostats (helicopters serial No. prior to 56-4313) or registers (3, 7, 9, 10, 17, 18, 20, and 24) are installed in the main heating ducts, three on each side of the cabin and one on each side of the cockpit. The CABIN HEAT-LOW-OFF-HIGH switch controls the heater and fan for heating operations. When the switch is placed in either LOW or HIGH position, both the blower and heater are turned on. When the switch is turned to the OFF position, the blower continues to operate until the air temperature within the plenum duct drops to 49°C (120°F), thereby expelling all exhaust gases from the heater and permitting the system to cool quickly and safely. The CABIN HEAT-FAN-ON switch, located on the overhead control panel, controls the fan when only cool air ventilation is desired. Four thermal

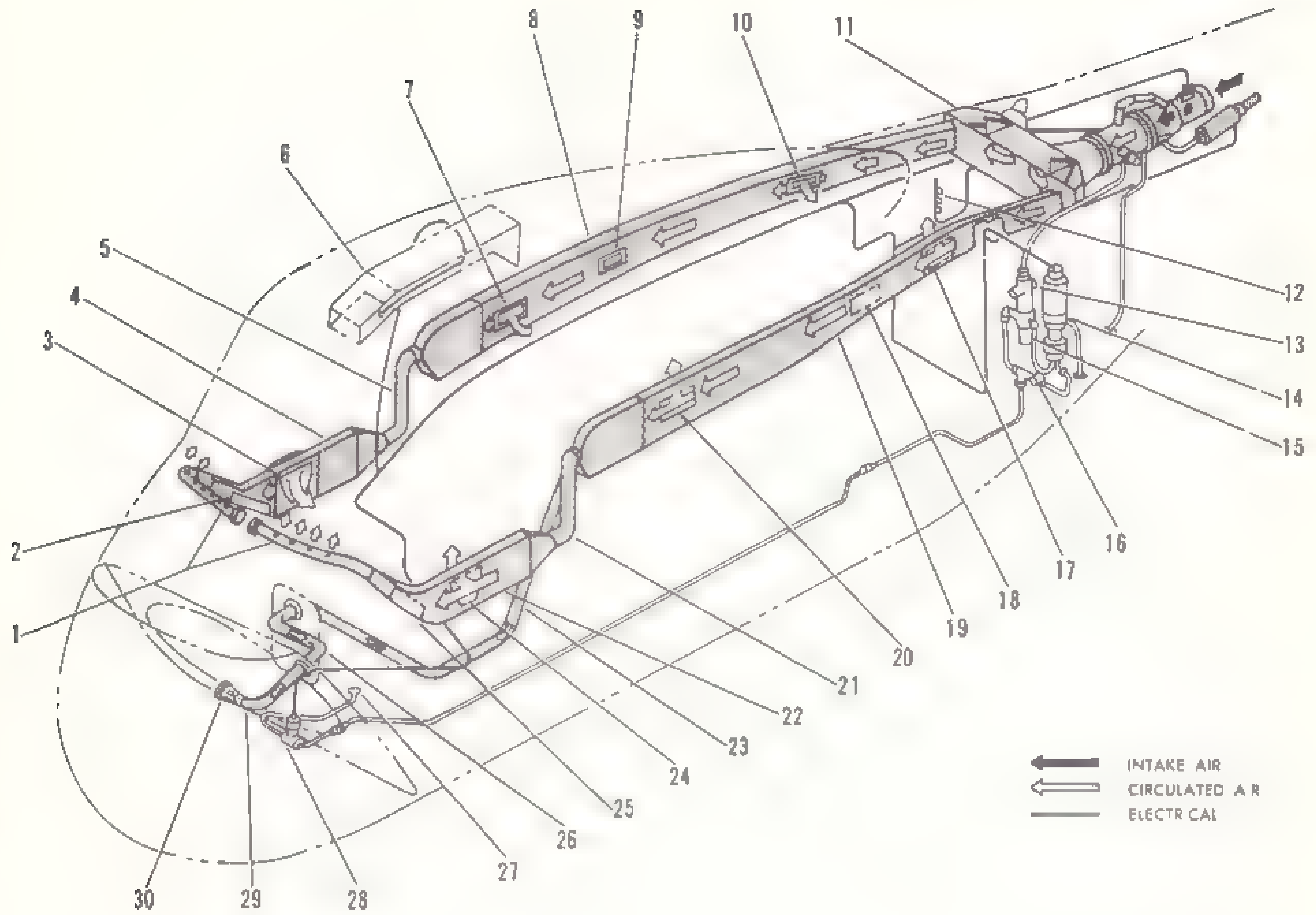


1. Thermal Switch 66°C (151°F)
2. Thermal Switch 141°C (286°F)
3. Thermal Switch 177°C (351°F)
4. Plenum Duct
5. Air Pressure Switch
6. Forward Adapter
7. Damper Assembly (Helicopters Serial No. Prior to 56-4313); Elbow (Helicopters Serial No. 56-4313 and Subsequent)
8. Blower
9. Air Intake Scoop
10. Ignition Unit
11. Aft Adapter
12. Exhaust Tube
13. Heater
14. Thermal Switch 49°C (120°F)

Figure 11–1. Heater installation

switches (1, 2, 3, and 14, figure 1–1) mounted on the plenum duct (4) control the output temperature of the heater when it is in operation. The 49°C (120°F) switch will automatically turn the blower on whenever the secondary bus of the electrical system is energized and the temperature within the plenum duct reaches 49°C (120°F). The heater fuel system consists of a heater fuel pump (1, figure 11–3), fuel filter (5), pressure relief valve (4), and fuel solenoid valves. Fuel is carried from the forward tank sump to the forward fuel solenoid valve (28, figure 11–2) which is located in the fuselage bottom structure. From this valve, fuel is carried to the fuel filter (5, figure 11–3) located on the forward bulkhead of the heater compartment. From the filter, fuel passes to the heater fuel pump (1) located directly above the filter and then to the pressure relief valve (4) which is suspended from the aft fuel solenoid valve (3). From the pressure relief valve, fuel passes through the aft fuel solenoid valve and then to the inlet port of the heater.

11–5. Troubleshooting. For troubleshooting procedure for the heating system, proceed as follows:

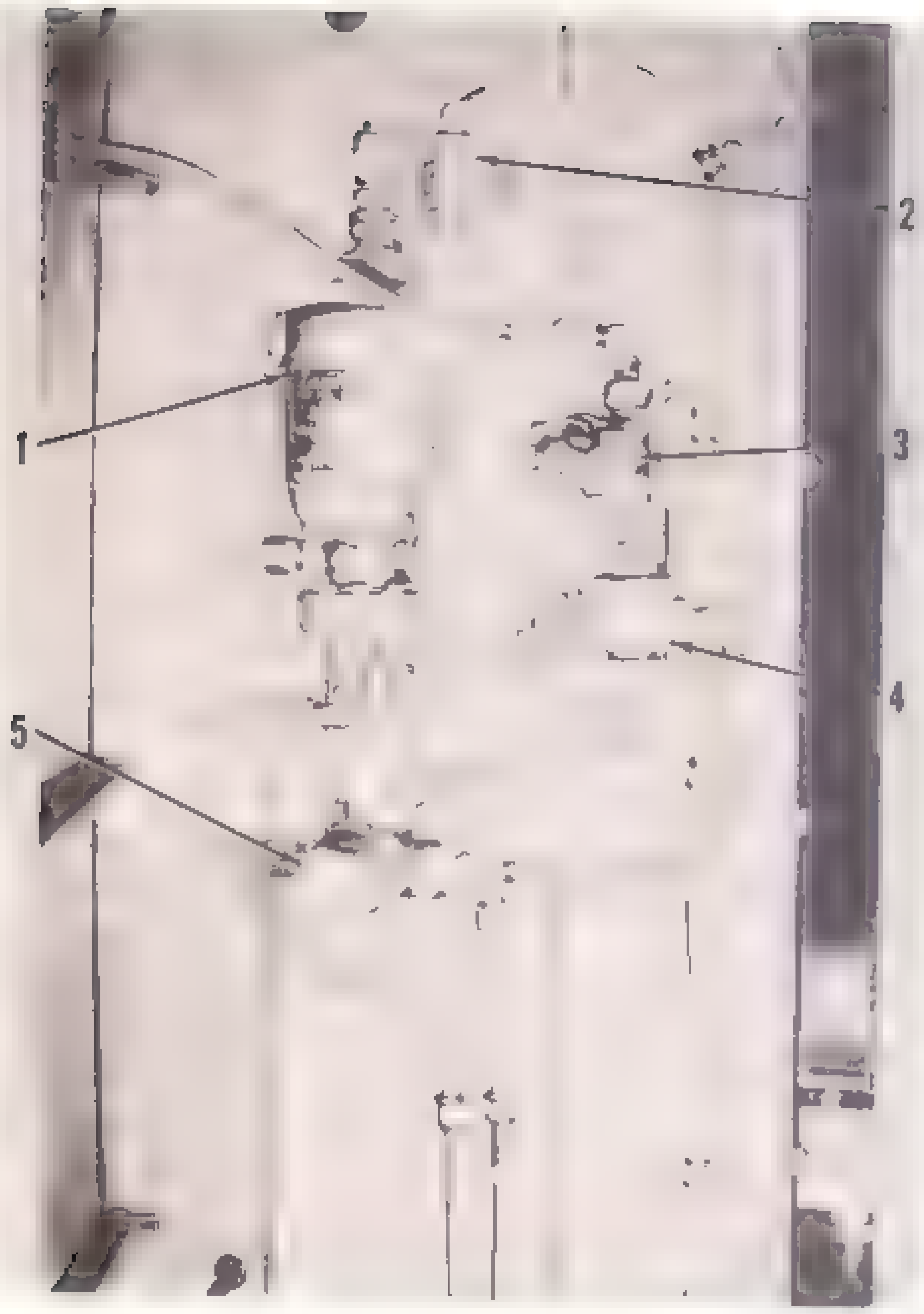


1. Flexible Defroster Duct (Helicopters Serial No. Prior to 56-4323); Nozzle and Flexible Duct (Helicopters Serial No. 56-4323 and Subsequent)
2. Diffuser Assembly (Helicopters Serial No. 56-4313 and Subsequent)
3. Cockpit Anemostat (Register) (Helicopters Serial No. Prior to 56-4313)
4. Cockpit Duct
5. Adapter
6. Overhead Control Panel
7. Cabin Anemostat (Register)
8. Main Heating Duct
9. Cabin Anemostat (Register)
10. Cabin Anemostat (Register)
11. Heater Installation
12. Relay
13. Aft Fuel Solenoid Valve
14. Heater Fuel Pump
15. Pressure Relief Valve
16. Fuel Filter
17. Cabin Anemostat (Register)
18. Cabin Anemostat (Register)
19. Main Heating Duct
20. Cabin Anemostat (Register)
21. Adapter
22. Cockpit Duct
23. Preheat Duct (Aft Section)
24. Cockpit Anemostat (Register) (Helicopters Serial No. Prior to 56-4313)
25. Diffuser Assembly (Helicopters Serial No. 56-4313 and Subsequent)
26. Preheat Duct (Center Section)
27. Strainer
28. Forward Fuel Solenoid Valve
29. Preheat Duct (Forward Section)
30. Connector Assembly

Figure 11—2. Heating and ventilating system diagram

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Heater does not ignite	No power to ignition unit	Close switches or replace burned out fuses.
	Inoperative vibrator in ignition unit	Replace vibrator.
	Faulty spark plug	Replace spark plug. (Refer to paragraph 11–7.)
	Faulty shielded lead	Replace shielded lead.
	Worn ground electrode	Replace electrode.
	Ignition unit inoperative	Replace ignition unit. (Refer to paragraph 11–9.)
	Fuel solenoid valve not energized	Close switches, check circuits to solenoid valves, replace burned out fuses, replace inoperative thermal switches. (Refer to paragraph 11–11.)
	Faulty pressure relief valve	Replace pressure relief valve. (Refer to paragraph 11–18.)
	Fuel filter clogged	Replace filter element or clean if new one is not available. (Refer to paragraph 11–17.)
	Spray nozzle clogged	Notify direct support maintenance unit.
	Fuel solenoid valve inoperative	Replace solenoid valve. (Refer to paragraph 11–19.)
	Strainer in forward tank sump clogged	Clean strainer. (Refer to paragraph 5–96.)
	Leaks or obstruction in combustion air inlet line	Repair leaks or remove obstructions.
Heater is cycled off and on by 177°C (351°F) overheat switch	Overheat switch out of calibration or faulty	Replace switch. (Refer to paragraph 11–11.)
	Blower air stream may be obstructed	Remove obstructions.
Backfiring, pulsating combustion, or smoky exhaust	Fouled spark plug	Clean or replace spark plug. (Refer to paragraph 11–7.)
	Spray nozzle dirty or loose	Notify direct support maintenance unit.
	Spray nozzle is oversize	Notify direct support maintenance unit.
	Faulty pressure relief valve	Replace pressure relief valve. (Refer to paragraph 11–18.)
	Core loose in spray nozzle	Notify direct support maintenance unit.
	Restriction in exhaust line	Remove restriction.
	Insufficient combustion air	Remove obstructions.

11–6. Heater. The 50,000 BTU heater (13, figure 11–1) is located at the top of the heater compartment just aft of the electronics compartment rear bulkhead. The heater is cylindrical in shape and is fabricated of heat-resisting alloy steel welded gastight. Combustion takes place inside a cylindrical combustion chamber which is surrounded by a double-walled radiator. At the inlet end of the heater are the fuel and combustion air inlets and the exhaust outlet. At the opposite end, four crossover passages connect the combustion chamber to the radiator. Enclosing the combustion chamber and radiator for the length of the radiator is a stainless steel wrap-around jacket with a self-sealing joint. It is held at a uniform distance from the radiator by spacers and is held in place by three jacket clips on the outside of the jacket. A removable spray-type head,



1. Heater Fuel Pump
2. Noise Filter
3. Aft Fuel Solenoid Valve
4. Pressure Relief Valve
5. Fuel Filter

Figure 11–3. Heater, fuel pump, valves, and filter installation

in which are mounted the fuel spray nozzle, spark plug, and ground electrode, is fitted over the inlet end of the combustion chamber. Fuel is admitted under pressure to the combustion chamber through the spray nozzle. Air is admitted to the combustion chamber through the combustion air inlet at the top of the heater. The cone-shaped fuel spray produced by the nozzle is mixed with combustion air and ignited by the spark plug. Electric current for the spark plug is supplied by a high potential ignition unit (10) operating from the helicopter's dc power supply. A shielded lead connects the ignition coil to the spark plug. A small amount of the combustion air is introduced around the spray nozzle. This air is taken from a tapping in the combustion air inlet and fed through a tube to the nozzle holder. The fresh air thus introduced around the nozzle restrains carbon formation. Air for combustion enters the combustion chamber at right angles to its length and on a tangent to its inner surface. This causes the air to have a whirling or spinning action. The vaporized fuel mixes with this spinning air and, after igniting, produces a whirling flame. Combustion, therefore, takes place throughout the full length of the combustion chamber. At the other end of the combustion chamber the burned gases pass through crossover passages into the radiator and return through the radiator to the inlet end where the gases pass through the outlet flue to the exhaust tube (12). Air to be heated passes through the heater between the combustion chamber and radiator and between the radiator and outer jacket. After absorbing the heat generated by combustion, the air emerges from the outlet end of the heater.

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Remove screws securing cover plate to bottom of aft adapter (11, figure 11–1). Remove line from elbow on cover plate and slide plate back along ignition lead.

(3) Reach into access opening and disconnect ignition lead from spark plug. Withdraw lead from adapter and install protector cap on ignition lead.

(4) Remove clamp and damper assembly, or elbow (7), from combustion air inlet on top of heater (13).

(5) Disconnect tube leading to air pressure switch (5) at combustion air inlet of heater (13). Remove nipple from inlet.

(6) Disconnect fuel inlet tube at fuel inlet connection on heater.

(7) Disconnect fuel drain tube from heater.

(8) Remove clamp and exhaust tube (12) from heater.

(9) Support heater and remove clamp at each end of heater. Remove heater.

b. Cleaning. Clean heater with a clean cloth slightly moistened in solvent (item 4, table 1–8) and dry with compressed air.

c. Inspection. Inspect heater for cracks, dents, and corrosion.

d. Installation. (1) Position heater (13, figure 11–1) between forward and aft adapters (6 and 11) and secure clamps at each end of heater.

(2) Install exhaust tube (12) in left side of heater (13) and secure with clamp.

(3) Install fuel drain tube to heater.

(4) Install fuel inlet tube to fuel inlet connection on heater.

(5) Install nipple in combustion air inlet. Install tube from air pressure switch (5) to nipple.

(6) Position damper assembly, or elbow (7), to combustion air inlet on top of heater (13) and secure with clamp.

(7) Remove protector cap and insert ignition lead into access opening at bottom of aft adapter (11) and connect lead to spark plug in heater (13).

Caution

Do not overtighten ignition lead nut; to do so will result in malformed threads or damaged ignition elbow.

(8) Position cover plate against aft adapter (11) and install screws. Install line to elbow on plate.

(9) Install all removed access covers.

11—7. Heater Spark Plug. The heater spark plug, for the type S-50 heater, is of the single electrode type. The spark plug threads into the spray-type head, with a ground electrode threaded opposite, to provide the necessary spark to support combustion.

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Remove screw securing cover plate to bottom of aft adapter (11, figure 11—1). Remove line from elbow on cover plate and slide plate back along ignition lead.

(3) Reach into access opening and disconnect ignition lead from spark plug. Withdraw lead from adapter and install protector cap on ignition lead.

(4) Using a suitable spark plug wrench, remove spark plug from spray-type head and remove gasket.

b. Cleaning. (1) Clean the spark plug on an ordinary automotive spark plug cleaner.

Note

It may be necessary to use two adapters to raise the spark plug high enough to accommodate the long porcelain and electrode.

(2) Remove all loosened material and cleaning abrasive with dry, compressed air.

(3) Clean ignition lead and insulator with a clean dry cloth.

c. Inspection. (1) Inspect heater spark plug for cracked or broken porcelain, arcing, and carbon tracks.

(2) Inspect threaded barrel of heater spark plug for malformed threads.

(3) Inspect ignition lead and spring for cracks, distortion, and corrosion.

(4) Inspect insulator for cracks.

d. Installation. (1) Insert a serviceable heater spark plug (with new gasket) through access opening, and install fingertight in spray-type head.

(2) Using a suitable spark plug wrench, tighten heater spark plug to a torque of 28 foot-pounds.

(3) Remove protector cap from ignition lead and insert ignition lead through access opening. Install ignition lead cap on heater spark plug fingertight.

(4) Hold ignition lead elbow with one hand, to prevent twisting or kinking; using a suitable wrench, tighten ignition lead cap to a snug fit.

Caution

Do not overtighten ignition lead nut; to do so will result in malformed threads or damaged ignition elbow.

(5) Position cover plate against aft adapter (11, figure 11—1) and install screws. Install line to elbow on plate.

(6) Install all removed access covers.

11—8. Damper Assembly or Elbow. On helicopters serial No. prior to 56-4313, a damper assembly (7, figure 11—1) is installed on top of the heater combustion air inlet and connected to the aft adapter (11) by a flexible duct. A one-way door in the damper assembly permits air from the blower (8) to enter the combustion chamber of the heater. A pin, or rivet, in the bottom of the damper assembly tube prevents the one-way door from opening in the opposite direction. This, in turn, precludes any possibility of combustion gases entering the blower. On helicopters serial No. 56-4313 and subsequent, the damper assembly is replaced by an elbow (7).

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Remove clamp and flexible duct from aft end of damper assembly, or elbow (7, figure 11—1).

(3) Remove clamp and damper assembly, or elbow, from combustion air inlet on top of heater.

b. Cleaning. Clean flexible duct and damper assembly, or elbow with a clean cloth moistened with solvent (item 4, table 1—8).

c. Inspection. (1) Inspect flexible duct and damper assembly, or elbow, for cracks, dents, and corrosion.

(2) Inspect welds on damper assembly tube for cracks.

(3) Inspect pin in damper tube for security.

Note

On helicopters serial No. prior to 54-2912, check rivet in damper assembly tube for wear and security.

(4) Inspect bearings for binding or ratcheting.

d. Installation. (1) Position damper assembly, or elbow (7, figure 11—1), on combustion air inlet on top of heater (13) and secure with clamp.

Warning

On helicopters serial No. prior to 56-4313, install damper so door hangs vertically and opens forward.

(2) Slide end of flexible duct onto damper assembly, or elbow (7), and secure with clamp.

(3) Install all removed access covers.

11–9. Ignition Unit. The ignition unit (10, figure 11–1) is secured with clamps to the left side of the tail cone beside the blower (8). The ignition unit converts 28-volt direct current to high voltage and produces a continuous spark between the spark plug and the ground electrode within the heater (13). The unit is equipped with a coil assembly, two radio noise shields, and a vibrator.

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Disconnect electrical plug from receptacle on ignition unit (10, figure 11–1).

(3) Disconnect ignition lead from ignition unit.

(4) Loosen clamps securing ignition unit to side of tail cone and slide ignition unit out of clamps.

b. Cleaning. (1) Clean ignition unit with a clean cloth moistened with solvent (item 4, table 1–8).

(2) Clean ignition lead and insulator with a clean, dry cloth.

c. Inspection. (1) Inspect ignition unit for cracks, distortion, and corrosion.

(2) Inspect ignition lead for cracks, distortion, and corrosion.

(3) Inspect insulator for cracks.

d. Installation. (1) Slide ignition unit (10, figure 11–1) into clamps on side of tail cone and tighten clamps.

(2) Connect ignition lead to ignition unit.

(3) Connect electrical plug to receptacle on ignition unit.

(4) Install all removed access covers.

11–10. Blower. The blower (8, figure 11–1) is installed at the rear of the heater (13), and is separated from the heater by the aft adapter (11). The fan in the blower circulates heated air in the helicopter when the CABIN HEAT switch, on the overhead control panel (6, figure 11–2), is placed in either the HIGH or LOW position. The CABIN HEAT-FAN-ON switch, located adjacent to the CABIN HEAT-LOW-OFF-HIGH switch on the overboard control panel, is placed in the ON position when only cool air ventilation is desired. The blower will also go on automatically whenever the temperature in the plenum duct (4, figure 11–1) is above 49°C (120°F) and the secondary bus of the electrical system is energized. The motor which powers the blower has a rating of 0.3 horsepower at 12,000 rpm. The blower fan has a rating of 175 cfm at 5.0 inches of static pressure measured in inches of water.

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Remove electrical plug from receptacle top of blower (8, figure 11–1).

(3) Remove bolts securing blower to aft adapter (11).

(4) Support blower and remove bolts securing blower to support and angles. Remove blower.

(5) Remove bolts securing intake scoop (9) to blower. Remove intake scoop.

b. Cleaning. Clean blower and intake scoop with a clean cloth moistened with solvent (item 4, table 1–8).

c. Inspection. (1) Inspect blower and intake scoop for cracks, distortion, and corrosion.

(2) Inspect electrical plug and receptacle for bent pins, cracks, distortion, and corrosion.

d. Installation. (1) Position air intake scoop (9, figure 11–1) on blower (8) and install bolts.

(2) Position blower behind aft adapter (11) to support and angles and install bolts.

(3) Install bolts securing blower to aft adapter.

(4) Install electrical plug in receptacle on top of blower.

(5) Install all removed access covers.

11–11. Thermal Switches. Thermal switches (1, 2, 3, and 14, figure 11–1), for controlling the heating system, are installed on the plenum duct. On helicopters serial No. prior to 54-922, the switches are located on the top of the plenum duct. On helicopters serial No. 54-922 and subsequent, the switches are located on the right side of the aft face of the plenum duct. The 49°C (120°F) and 177°C (351°F) thermal switches are normally open; the 66°C (151°F) and 141°C (286°F) thermal switches are normally closed. The normally-open 177°C (351°F) thermal switch provides an overheat shutoff for the system. If the temperature in the plenum duct goes above 177°C (351°F), the thermal switch shuts off the heating system, except for the blower (8), until the CABIN HEAT switch on the overhead control panel (6, figure 11–2) is placed in the OFF position and then turned back to HIGH or LOW. The normally-open 49°C (120°F) thermal switch allows the blower to run whenever the temperature in the plenum duct is above 49°C (120°F) and the secondary bus of the electrical system is energized. The 66°C (151°F) and 141°C (286°F) thermal switches regulate the heating system for the LOW and HIGH positions, respectively, of the CABIN HEAT switch by turning the heating system

on and off to maintain the desired LOW or HIGH heat range in the plenum duct.

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Disconnect electrical leads from thermal switches.

(3) Remove screws securing thermal switches to plenum duct and remove thermal switches.

b. Inspection. (1) Inspect thermal switches for cracks and overheating.

(2) Inspect terminal lugs for cracks, distortion, and corrosion.

c. Installation. (1) Position thermal switches on plenum duct and install screws.

(2) Install electrical leads on thermal switches.

(3) Install all removed access covers.

11–12. Relays. Three relays (12, figure 11–2) used in the heating system are standard 28 volts dc, type relays supplied from a secondary supply circuit. Relays used in the blower, heater, and overheat circuits are located on the rear bulkhead of the electronics compartment.

a. Removal. (1) Remove necessary access covers to gain entry to electronics compartment.

(2) Disconnect electrical leads from relays.

(3) Remove screws, washers, and nuts securing relay to bulkhead.

b. Inspection. Inspect relays and electrical leads for corrosion, cracks, loose or damaged components, and indications of overheating, arcing, or burning.

c. Installation. (1) Position relay against bulkhead and install screws, washers, and nuts.

(2) Connect electrical leads to relays.

(3) Install all removed access covers.

11–13. Heater Controls. Cockpit anemostats (3 and 24, figure 11–2) are installed in the cockpit of helicopters serial No. prior to 56-4313. Diffuser assemblies (2 and 25) are installed in the cockpit on helicopters serial No. 56-4313 and subsequent. The passage of air from each anemostat can be controlled by a knob on the anemostat marked OPEN and CLOSED. The passage of air from each diffuser can be controlled by grasping the knob and moving the slide forward or aft.

a. Removal. (1) Remove anemostats on helicopters serial No. prior to 56-4313 by removing screws securing anemostats (3 and 24, figure 11–2) to cockpit duct (22). Remove anemostats.

(2) Remove diffuser assemblies (2 and 25) on helicopters serial No. 56-4313 and subsequent.

b. Cleaning. Clean anemostats or diffusers with a clean, dry cloth.

c. Inspection. Inspect anemostats or diffusers for cracks, dents, distortion, and corrosion.

d. Installation. (1) Install anemostats (3 and 24, figure 11–2) by positioning in cockpit duct (22) and installing screws.

(2) Install diffuser assemblies (2 and 25).

11–14. Heater Ducts. The heater ducts consist of the main heating ducts (8 and 19, figure 11–2) which are located in the cabin and the electronics compartment, and an adapter (5 and 21) and cockpit duct (4 and 22), located on each side of the cockpit. Each main heating duct is connected at one end to an outlet on the plenum duct (4, figure 11–1) and at the other end to one of the adapters in the cockpit. Three cabin anemostats, or registers (7, 9, 10, 17, 18, and 20, figure 11–2), are installed in each main heating duct, and a cockpit anemostat (3 and 24), or diffuser assembly (2 and 25), is installed in each cockpit duct. The passage of air from each anemostat can be controlled by a knob on the anemostat, marked OPEN and CLOSED. The passage of air from each diffuser can be controlled by grasping the knob and moving the slide forward or aft. A cover is installed over a fourth opening in each main heating duct. On helicopters serial No. 56-4313 and subsequent, the cockpit anemostats are replaced by diffuser assemblies (2 and 25).

a. Removal. (1) Remove screws and nuts securing cabin anemostats (7, 9, 10, 17, 18, and 20, figure 11–2) to main heating ducts (8 and 19). Remove anemostats.

Note

A cover is installed over a fourth opening in each main heating duct. In left-hand duct, this opening is located between forward and center cabin anemostats (18 and 20). In right-hand duct, this opening is located between center and aft cabin anemostats (9 and 10).

(2) Remove tape from all duct connections.

(3) Remove screws, washers, and nuts supporting main heating ducts (8 and 19). Remove main heating ducts.

(4) Remove clamps from top of adapters (5 and 21). Loosen wing bolts on bottom clamps of adapters and remove adapters.

(5) On helicopters serial No. prior to 56-4313, remove cockpit anemostats (3 and 24) from each cockpit duct (4 and 22) by removing screws.

(6) Remove clamps securing cockpit ducts (4 and 22) to flexible defroster ducts (1). Remove screws

and straps holding cockpit ducts in place. Remove cockpit ducts.

b. Cleaning. Clean anemostats, adapters, and ducts with a clean cloth moistened with solvent (item 4, table 1–8).

c. Inspection. Inspect heater ducts and attaching components for dents, cracks, chafing, corrosion, and distortion.

d. Installation. (1) Insert cockpit ducts (4 and 22) into each flexible defroster duct (1) and secure with clamp. Secure cockpit ducts in position with metal straps, screws, and nuts.

(2) On helicopters serial No. prior to 56-4313, secure cockpit anemostats (3 and 24) in each cockpit duct (4 and 22) with screws.

(3) Insert adapter (5 and 21) into end of each cockpit duct (4 and 22) and secure with clamps. Tighten wing bolt on each clamp. Fasten top part of each adapter to cabin bulkhead with clamps.

(4) Position each main heating duct (8 and 19) against cabin wall and install screws, washers, and nuts.

(5) Seal all duct connections with 2-inch wide tape (item 55, table 1–8).

(6) Position cabin anemostats (7, 9, 10, 17, 18, and 20) in each main heating duct (8 and 19) and install screws and nuts.

Note

A cover is installed over a fourth opening in each main heating duct. In left-hand duct, this opening is located between forward and center cabin anemostats (18 and 20). In right-hand duct, this opening is located between center and aft cabin anemostat (9 and 10).

11–15. Engine Preheat Duct. The engine preheat duct (23, 26, and 29, figure 11–2) extends from the adapter (21) on the forward end of the left main heating duct to the carburetor air intake duct and supplies warm air to the carburetor in subnormal temperatures. When not in use, the openings in the adapter and clutch access (carburetor induction heat) door are capped and the ducts stored in the stowage bag at the left rear of the cabin.

a. Removal. (1) Open nose doors.

(2) Disconnect forward section of engine preheat duct (29, figure 11–2) from connector assembly (30) at carburetor air intake duct. Remove coupling securing connector assembly (30) to air intake duct and remove connector assembly.

(3) Unfasten clamp of forward section of engine preheat duct from side cowl panel on engine and remove duct from flange mounted on canted bulkhead. Remove screw and clamp from cowl panel.

(4) Remove preheat duct (29) and close nose doors.

(5) Disconnect aft section of preheat duct (23) from adapter (21) on left main heating duct and flange on clutch access (carburetor induction heat) door. Remove preheat duct (23) and install caps in adapter opening.

(6) Release fasteners and pull clutch access door away from bulkhead sufficiently to disconnect center section of preheat duct (26) from flange on forward side of door. Remove clutch access door.

(7) Remove clamp securing center section of engine preheat duct to auxiliary hydraulic pressure tube.

(8) Reach into clutch compartment and disconnect preheat duct (26) from flange mounted on canted bulkhead and remove duct. Install clutch access door and secure fasteners.

b. Cleaning. Clean engine preheat duct with a clean cloth moistened with solvent (item 4, table 1–8). Dry with compressed air.

c. Inspection. Inspect engine preheat duct and attaching components for dents, cracks, chafing, corrosion, and distortion.

d. Installation. (1) Release fasteners and remove clutch access door.

(2) Reach into clutch compartment and connect center section of engine preheat duct (26, figure 11–2) to flange mounted on canted bulkhead.

(3) Position preheat duct (26) to auxiliary hydraulic pressure tube and install clamp.

(4) Connect preheat duct (26) to flange on inside of clutch access door. Position door on bulkhead and secure with fasteners.

(5) Remove caps and connect aft section of preheat duct (23) to adapter on left main heating duct (19) and flange on clutch access duct.

(6) Open nose doors.

(7) Install connector assembly (30) on warm air entrance of carburetor air intake duct and secure with coupling.

(8) Connect end of forward section of preheat duct (29) to connector assembly (30) and other end to flange mounted on canted bulkhead.

(9) Position preheat duct (29) to side cowl panel on engine and install clamp.

(10) Close nose doors.

11–16. Heater Fuel Pump. The heater fuel pump (1, figure 11–3) has a rated flow of 4 gph and an operating pressure of 25 psi. The electric motor which operates the fuel pump is a 28-volt dc, 1.0-ampere, explosion-proof unit. The fuel pump delivers fuel through the pressure relief valve (4) and aft fuel solenoid valve (3) to the heater. A drain line attached to the fuel pump extends down and through the bottom

of the helicopter. The fuel pump is secured to a bracket on the forward bulkhead in the heater compartment.

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

Caution

When removing any component of the heater fuel system, insure that the CABIN HEAT switch, located on the overhead control panel (6, figure 11–2), is in the OFF position. Drain fuel lines into a suitable container.

(2) Remove electrical plug from receptacle on heater fuel pump (1, figure 11–3).

(3) Remove drain and inlet and outlet tubes from fuel pump.

(4) Cut lockwire and remove screws and washers securing fuel pump to bracket.

(5) Remove nipple from drain port of fuel pump.

(6) Remove union and gasket from outlet port of fuel pump.

(7) Remove elbow, gasket, and nut from inlet port of fuel pump.

b. Cleaning. Clean heater fuel pump with a clean cloth moistened with solvent (item 4, table 1–8). Dry with compressed air.

c. Inspection. (1) Inspect heater fuel pump for cracks, dents, distortion, corrosion, and malformed threads.

(2) Inspect electrical connection for distortion, bent or broken pins, and corrosion.

d. Installation. (1) Install elbow, gasket, and nut in inlet port of heater fuel pump (1, figure 11–3).

(2) Install union and gasket in outlet port of fuel pump.

(3) Install nipple in drain port of fuel pump.

(4) Position fuel pump on bracket and install screws and washers. Secure screws with lockwire.

(5) Install drain and inlet and outlet tubes to fuel pump.

(6) Install electrical plug on top of fuel pump.

e. Maintenance Operational Check. (1) Engage heater controls in accordance with TM 55-1520-202-10.

(2) Inspect heater fuel pump connections for possible leakage.

(3) Install all removed access covers.

11–17. Heater Fuel Filter. The heater fuel filter (5, figure 11–3) is used to remove any solid foreign matter from fuel supplied to the heater. The filter has a replaceable element of the compressed disc type. Fuel, passing between the discs, leaves impurities on the outside edge of the discs. Direction of fuel flow is from the outside of the filter element to the inside. Spring tension maintains compression on the filter disc. The fuel filter is secured to a bracket on the forward bulkhead of the heater compartment below the heater fuel pump (1).

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Remove tubing from outlet port of fuel filter (5, figure 11–3) and from tee in inlet port of filter.

(3) Remove screws, washers, and nuts securing fuel filter to mounting bracket.

(4) Remove union and gasket from OUT port of filter, and tee, gasket, and nut from IN port of filter.

(5) Cut lockwire and remove filter bowl. Remove filter element, retaining spring, and gasket.

b. Cleaning. Wash heater fuel filter components with solvent (item 4, table 1–8). Dry with compressed air.

c. Inspection. Inspect heater fuel filter components for cracks, dents, distortion, malformed threads, and corrosion.

d. Installation. (1) Position gasket, filter, and retaining spring in filter head and install bowl. Lockwire filter bowl to head.

(2) Install tee, gasket, and nut in IN port of heater fuel filter (5, figure 11–3), and union and gasket in OUT port of fuel filter.

(3) Position fuel filter on mounting bracket and install screws, washers, and nuts.

(4) Install tubing to tee in inlet port of fuel filter and union in outlet port.

(5) Install all removed access covers.

11–18. Pressure Relief Valve. The pressure relief valve (4, figure 11–3) opens at 12 psi and bypasses fuel back to the heater fuel pump (1). The pressure relief valve is attached to the bottom of the aft fuel solenoid valve (3) which is secured to a bracket on the forward bulkhead in the heater compartment.

a. Removal. (1) Remove necessary access covers to gain entry to heater compartment.

(2) Remove inlet and outlet tubes from elbows in pressure relief valve (4, figure 11–3).

(3) Disconnect electrical wiring and outlet tube from aft fuel solenoid valve (3).

(4) Remove screws, washers, nuts, and spacers securing solenoid valve to mounting bracket. Remove pressure relief valve (4) and aft fuel solenoid valve (3) as a unit.

(5) Loosen jam nut and remove pressure relief valve (4) from union in inlet port of aft fuel solenoid valve (3).

(6) Remove elbow, gasket, and nut from each port of pressure relief valve (4).

b. Cleaning. Clean pressure relief valve with a clean cloth moistened with solvent (item 4, table 1–8). Dry with compressed air.

c. Inspection. Inspect pressure relief valve for cracks, dents, distortion, corrosion, and malformed threads.

d. Installation. (1) Install elbow, gasket, and nut in each port of pressure relief valve (4, figure 11–3).

Note

These ports are directly opposite each other.

(2) Insure that jam nut and gasket are installed on union in inlet port of aft fuel solenoid valve (3). Install pressure relief valve (4) onto union. Tighten jam nut.

Note

Inlet port of pressure relief valve must be to the left.

(3) Position both valves as a unit on mounting bracket and secure with screws, washers, nuts, and spacers.

(4) Connect electrical wiring and outlet tube to aft fuel solenoid valve (3).

(5) Connect inlet and outlet tubes to elbows in pressure relief valve (4).

e. Maintenance Operational Check. (1) Engage heater controls in accordance with TM 55-1520-202-10.

(2) Inspect pressure relief valve connections for possible leakage.

(3) Install all removed access covers.

11–19. Fuel Solenoid Valves. The heater fuel system consists of two fuel solenoid valves. The forward fuel solenoid valve (28, figure 11–2), which controls the flow of fuel to the heater fuel system, is mounted on a bracket in the fuselage bottom structure directly beneath the clutch compartment floor and on the centerline of the helicopter. The aft fuel solenoid valve (13) controls the flow of fuel from the heater fuel pump (14) to the heater. The aft fuel solenoid valve is mounted on the forward bulkhead in the heater compartment just to the right of the heater fuel pump. The forward and aft fuel solenoid valves are controlled by CABIN HEAT switches located on the overhead control panel (6).

a. Removal. (1) Remove forward fuel solenoid valve as follows:

(a) Drain forward fuel tank in accordance with table 1–6.

(b) Open hinged access panel at bottom of helicopter at forward end of fuel line fairing.

(c) Disconnect electrical plug and inlet and outlet tubes from forward solenoid valve (28, figure 11–2).

(d) Remove screws, washers, spacers, and nut securing forward solenoid valve to mounting bracket.

(e) Remove elbow, gasket, and nut from each port of solenoid valve.

(2) Remove aft fuel solenoid in accordance with paragraph 11–18*a*, steps (1) through (5).

b. Cleaning. Clean fuel solenoid valves with a clean cloth moistened with solvent (item 4, table 1–8).

c. Inspection. (1) Inspect fuel solenoid valves for cracks, dents, distortion, corrosion, and malformed threads.

(2) Inspect electrical connections for cracks, distortion, bent or broken pins, and corrosion.

d. Installation. (1) Install forward fuel solenoid valve as follows:

(a) Install elbow, gasket, and nut in each port of forward fuel solenoid valve (28, figure 11–2).

(b) Position solenoid valve on mounting bracket in the fuselage bottom structure and install screws, washers, spacers, and nuts.

(c) Connect inlet and outlet tubes and electrical plug to solenoid valve.

(2) Install aft fuel solenoid valve in accordance with paragraph 11–18*d*, steps (2) through (5).

e. Maintenance Operational Check. (1) Engage heater controls in accordance with TM 55-1520-202-10.

(2) Inspect all fittings of forward and aft fuel solenoid valves for possible leakage.

(3) Close hinged access panel at bottom of helicopter at forward end of fuel line fairing.

(4) Install all removed access covers.

11–20. Ventilating System. Eight controllable anemostats, or diffusers, are installed in the main heating ducts, three on each side of the cabin and one on each side of the cockpit. The CABIN HEAT-FAN-ON switch, located on the overhead control panel, controls the fan when cool air ventilation is desired. Two cabin air vents are installed for fresh air ventilation.

11–21. Cockpit Ventilation. Ventilation for the cockpit is accomplished through the anemostats, or diffusers, located in the cockpit heat duct. For maintenance refer to paragraph 11–14.

11–22. Cabin Ventilation. Ventilation for the cabin is accomplished through the anemostats, or diffusers, located in the main heating ducts. (Refer to paragraph 11–14.)

11–23. Cabin Air Vents. Cabin air vents are installed at the rear of each cabin bulkhead slightly above floor level. Each vent is equipped with a screen and a lever to adjust the vent. When the lever is forward, the vent is CLOSED. When the lever is aft, the vent is OPEN.

a. Removal. (1) Remove nut and washers securing lever to clip.

(2) Remove pin securing knob to lever.

b. Cleaning. Clean metal parts with a clean cloth moistened with solvent (item 4, table 1–8).

c. Inspection. Inspect all parts for cracks, distortion, and corrosion.

d. Installation. (1) Position knob on lever and install pin.

(2) Position lever on clip and install washers and nuts.

Section III Anti-Icing System

Not Applicable

Section IV Oxygen System

Not Applicable

Section V Fire Detector System

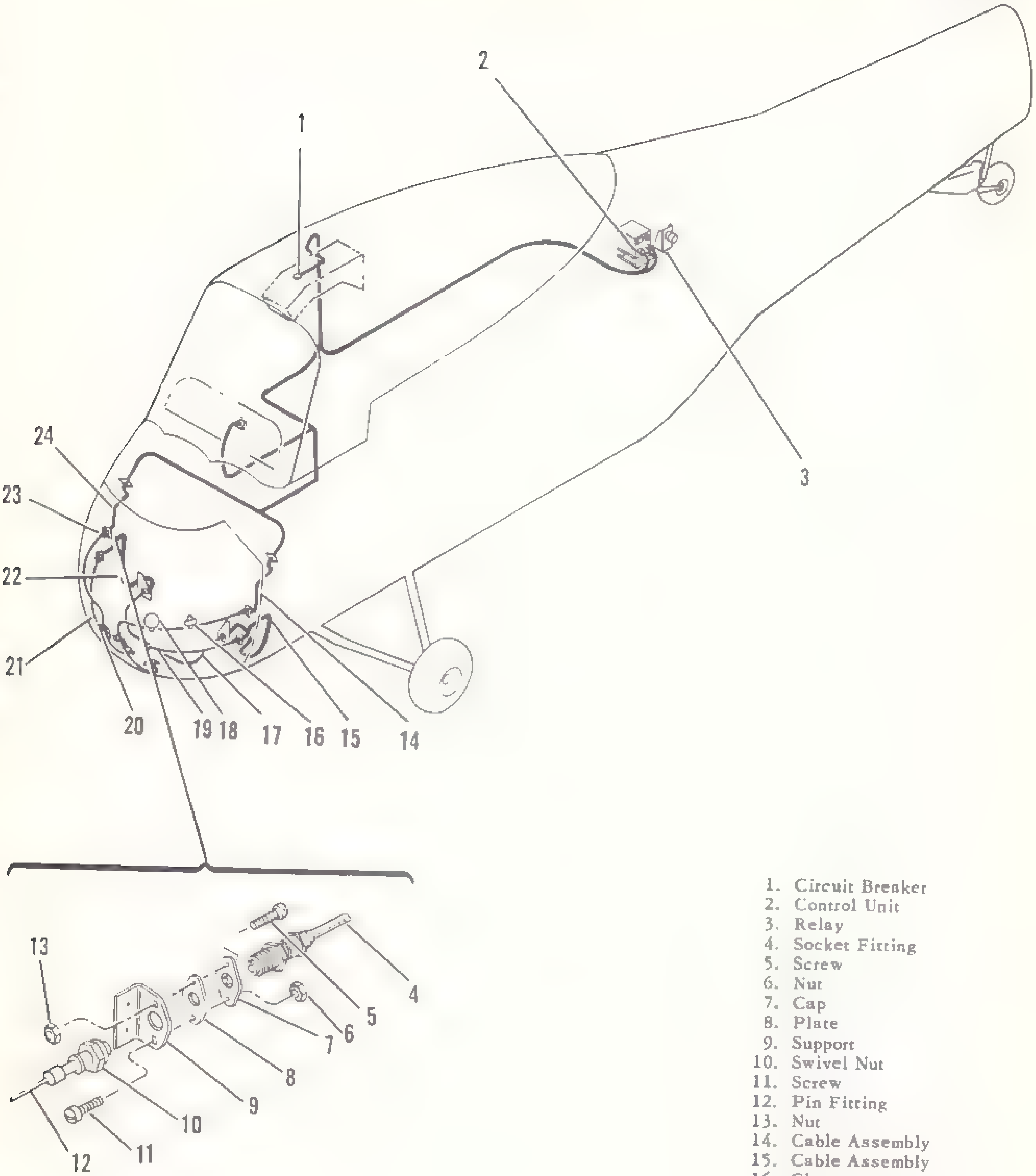
11–24. Description. A continuous-resetting-type fire detector system (figure 11–4) is installed in the helicopter to warn the pilot of fire or excessive heat in the engine compartment by illuminating a red warning light on the instrument panel. The fire detector system consists primarily of the following: Three sensing elements (17, 19, and 21), one mounted on the inner surface of each nose door and one just forward of the oil cooler; four cable assemblies (14, 15, 22, and 24), two connecting the three sensing elements in series and two routed from the sensing elements to the canted bulkhead; a control unit (2), a relay (3), and a mounting base located in the electronics compartment; and a warning light, marked FIRE DET-WARN, and a test switch, marked FIRE DET-TEST, both located on top of the main switch panel on the instrument panel. On helicopters serial No. prior to 56-4313, the relay and control unit are both located in the electronics compartment on the shelf directly above the inverters. On helicopters serial No. 56-4313 and subsequent, the relay and control unit are mounted on the lower shelf on the forward righthand bulkhead in the electronics compartment. Operation of the fire detector system depends on the electrical resistance between the two element wires in the sensing elements. This resistance is lowered by any rise in the temperature of the sensing element. The resistance of the sensing elements is continually monitored by the control unit which also controls the FIRE DET-WARN light. Any great decrease in resistance, indicating that an excessive temperature exists along some portion of one or more sensing elements, closes a contact within the control unit and illuminates the FIRE DET-WARN light. The control unit is adjustable so that warnings are given only when abnormal temperatures, 277°C (531°F) or above, exist and not as a result of normal engine temperature. The FIRE DET-TEST switch is used to test continuity and proper operation of the entire fire detector system.

11–25. Sensing Elements. The sensing elements (17, 19, and 21, figure 11–4) are the components of the fire detector system that detect the presence of fire or excessive heat. A sensing element is secured with clamps and grommets to the inner surface of each nose door and to the large interconnecting tube between the oil cells just forward of the oil cooler. Each element is composed of an inconel tube containing two wires imbedded in a specially formulated ceramic core. One wire is a ground wire connected to the inconel tube. The electrical resistance between the two wires varies inversely with the temperature. Therefore, an increase in temperature along any portion of a sensing element will cause a corresponding drop in the electrical resistance of that element. This drop in resistance is the factor that illuminates the FIRE DET-WARN light on the instrument panel through the action of the control unit. Since the fire detector system is the resetting type, exposure to fire or excessive heat does not necessitate replacement of the sensing element. However, after exposure to fire or excessive heat, the sensing element must be checked in accordance with paragraph 11–29, steps *a* and *b*. The elements must be replaced if physical damage occurs beyond the limits specified in paragraph 11–29.

11–26. Removal. a. Open nose doors and remove cable assembly from sensing element assembly.

b. Remove socket fitting and swivel nut (4 and 10, figure 11–4) from support (9).

c. Remove screws (5 and 11) and nuts (6 and 13) securing cap (7) and plate (8) to support (9).



1. Circuit Breaker
2. Control Unit
3. Relay
4. Socket Fitting
5. Screw
6. Nut
7. Cap
8. Plate
9. Support
10. Swivel Nut
11. Screw
12. Pin Fitting
13. Nut
14. Cable Assembly
15. Cable Assembly
16. Clamp
17. Sensing Element
18. Tab
19. Sensing element
20. Shield
21. Sensing Element
22. Cable Assembly
23. Cap and Plate Assembly
24. Cable Assembly

Figure 11-4. Fire detector system diagram

Table 11–1. Minimum Insulation Resistance of Sensing Elements

ELEMENT NUMBER	LOCATION	*RESISTANCE MEGOHMS
804144	LH Nose Door	200
804120	RH Nose Door	200
804048	Oil Cooler	200

*Using megger of 500-volt maximum output.

11–27. Cleaning. Clean all parts with a clean cloth moistened with solvent (item 4, table 1–8).

11–28. Inspection. a. Inspect all parts for cracks, distortion, corrosion, and malformed threads.

b. Inspect sensing element for bad kinks and tool dents. Sensing elements in which kinks and dents have smooth contours and in which diameter of inconel tube has not been decreased to 0.040 inch in any location may be continued in service if insulation resistance and resistance of internal element wires are within limits outlined in table 11–1.

Caution

Do not try to straighten acceptable kinks and dents as this will set up stresses in tube and create potential failure.

c. Inspect surface of sensing element for any abrasion from which any material has been removed. Replace any element where this condition is found.

d. Inspect sensing element for any crushed section resulting in decrease of diameter of inconel tube to 0.040 inch or below. A sensing element in which diameter of crushed section is greater than 0.040 inch may be continued in service if insulation resistance and resistance of internal element wires are within limits outlined.

e. Inspect connector seats for nicks, deep scratches, or gall marks.

11–29. Testing. Make a preliminary ohmmeter check of the system insulation resistance from pin contact to ground. The insulation resistance of the system from pin contact to ground should not be less than the total insulation resistance of the three sensing elements divided by three. If the ohmmeter reading is higher than this value, make a system megger check. If either the ohmmeter or megger reading of the system is lower than the total insulation resistance of the three sensing elements divided by three, the insulation resistance of each sensing element should be checked as follows:

a. Check insulation resistance of sensing element, pin to ground, with megger of 500-volt maximum output. Minimum reading for each sensing element is given in table 11–1. Replace any element that fails to meet minimum reading.

b. Check continuity and resistance of internal element wires of each sensing element with an ohmmeter connected to center pin contact at each end of element. Maximum wire resistance should be 7 ohms per foot of element. Replace any element whose resistance exceeds maximum.

11–30. Installation. a. Position plate and cap (8 and 7, figure 11–4) to support (9) and install screws (5 and 11) and nuts (6 and 13).

b. Install socket fitting and swivel nut (4 and 10) on support (9).

c. Install cable assembly on sensing element assembly and close nose doors.

11–31. Control Unit. The control unit (2, figure 11–4) is installed on a mounting base on the shelf in the electronics compartment. The control unit, which is basically a Wheatstone bridge, continually monitors the resistance of the three sensing elements. In the event of an excessive temperature rise along some portion of one or more of the sensing elements, the corresponding decrease in the resistance of the sensing elements causes the bridge in the control unit to become unbalanced. This, in turn, closes an electrical contact within the control unit and illuminates the FIRE DET-WARN light. The control unit is equipped with an adjustable potentiometer which is used to adjust the control unit so warnings are given only when abnormal temperatures exist and not as a result of normal engine temperature.

11–32. Inspection. Disconnect electrical plug, marked DETECTOR, located on control unit and inspect for cracks, bent or broken pins, distortion, corrosion, and malformed threads.

11–33. Test Procedure. Control unit may be tested for proper functioning by following procedure:

a. Disconnect electrical plug, marked DETECTOR, located on control unit.

b. Connect variable resistor pins A and B of receptacle, marked DETECTOR.

c. Apply power to control unit by turning on BATT and FLT-MAIN-OFF-SPARE switches.

d. Set variable resistor at resistance greater than 18,900 ohms.

e. Slowly decrease external resistance until warning lamp lights. This tests complete warning lamp and relay circuit.

f. Slowly increase external resistance until test lamp goes out. Make note of external resistance value at this point which is off or fire-out point.

g. Slowly decrease the external resistance until test lamp lights. Make note of this resistance which is fire-on or trip point.

Note

Light must come on at 18,000 ± 900 ohms external resistance.

h. Slowly increase external resistance until test lamp goes out.

Note

Off point or fire-out resistance shall not exceed fire-on or trip point value by more than 50 percent.

i. Slowly decrease external resistance until test lamp lights. Light must come on at 18,000 ± 900 ohms.

Section VI Fire Extinguisher System

11–34. Description. The fire extinguisher system consists primarily of a portable fire extinguisher located in the forward right corner of the cabin.

11–35. Fire Extinguisher. The portable pressurized fire extinguisher, type CF_3Br (Monobromotrifluoromethane), is held in place by a bracket with a tight-fitting, quick-release, spring steel clamp. The bracket is secured to the bulkhead with bolts, washers, and nuts. To operate fire extinguisher, remove from mounting bracket, pull ring pin, point discharge horn close to base of flame, depress trigger, and keep base of flame covered. Replace fire extinguisher with a serviceable one immediately after use.

Warning

Monobromotrifluoromethane (CF_3Br) is very volatile, but is not easily detected by its odor. Although nontoxic, it must be considered to be about the same as other freons and carbon dioxide, causing danger to personnel primarily by reduction of oxygen available for proper breathing. During operation of the fire extinguisher, ventilate personnel areas with fresh air. The liquid should not be allowed to come into contact with the skin, as it may cause frostbite or low temperature burns because of its very low boiling point.

11–36. Removal. a. Break breakaway wire securing fire extinguisher to mounting bracket.

b. Release quick-release clamp and remove fire extinguisher from mounting bracket.

11–37. Inspection. a. Inspect fire extinguisher for broken or missing seal.

b. Inspect fire extinguisher by weighing. If fire extinguisher is underweight, as indicated on instruction plate, replace fire extinguisher.

Note

Check weight of fire extinguisher every 6 months and replace if gross weight has decreased 4 ounces or more from the fully charged weight of 5 lb, 11 ounces.

c. Inspect mounting bracket and quick-release clamp for cracks and distortion.

11–38. Installation. a. Install fire extinguisher in mounting bracket and secure with quick-release clamp.

b. Secure quick-release clamp with breakaway wire.

Section VII Defroster System

11–39. Description. Windshield defroster ducts are installed along the lower edge of the pilot's and copilot's windshield. A flexible defroster duct (1, figure 11–2) connected to the cockpit duct (4) directs air from the heating and ventilating system to a nozzle assembly which distributes air to the cockpit windshields.

11–40. Defroster Ducts. The defroster ducts are mounted below the windshield in the cockpit. On helicopter serial No. prior to 56-4323, the defroster units consist of flexible defroster ducts (1, figure 11–2). On helicopters serial No. 56-4323 and subsequent, the defroster units consist of nozzles and flexible defroster ducts. On helicopters serial No. 56-4313 and subsequent, the cockpit anemostats are replaced by diffuser assemblies (2 and 25) and a damper assembly is installed inside each cockpit heater duct between the diffuser assembly and the flexible defroster duct. The damper controls the flow of air to the windshield defroster ducts, or nozzles.

11–41. Removal. a. Remove screws and clamps from flexible defroster duct (1, figure 11–2) and remove ducts.

b. On helicopters serial No. 56-4323 and subsequent, remove screws from tieplate and remove nozzle and tieplate.

c. On helicopter serial No. 56-4313 and subsequent, remove damper assembly as follows:

(1) Remove screws and damper from diffuser assembly.

(2) Remove pin securing knob to diffuser assembly and remove knob.

11–42. Cleaning. a. Wipe clean all parts with a clean cloth.

b. Clean ducts and nozzles by applying dry compressed air to remove dust and foreign material.

11–43. Inspection. a. Inspect all parts for cracks, dents, distortion, and corrosion.

b. Inspect ducts and nozzles for cracks, dents, and distortion.

11–44. Installation. a. On helicopter serial No. 56-4313 and subsequent, install damper assembly as follows:

(1) Position knob to diffuser assembly and install pin securing knob to diffuser assembly.

(2) Install damper in diffuser assembly and secure with screws.

b. On helicopters serial No. 56-4323 and subsequent, install nozzle and tieplate and install screws in tieplate.

c. Install ducts on flexible defroster duct (1, figure 11–2) and secure with screws and clamps.

Section VIII Windshield Wiper System

11–45. Windshield Wiper System. A single windshield wiper is installed on the right-hand, or pilot's, side of the cockpit windshield. The wiper blade and arm assembly (2, figure 11–5), which operate over a 120-degree sector of the windshield, are connected to the shaft of a converter (1) on the windshield frame. The converter is driven by a dc electric motor (7) through a flexible drive (6). The motor is mounted on a bracket located at the canted firewall behind the instrument panel just to the right of the centerline of the helicopter. Access to the motor is gained by removing the instrument panel cowl. The windshield wiper is controlled by the WINDSHIELD WIPER switch, located on the overhead control panel (5), which has the marked positions PARK, OFF, FAST, MED, and SLOW. The circuit is protected by a circuit breaker (3). Two resistors (4), to regulate the speed of the motor, are installed in the relay and resistor installation located behind the cockpit dome light.

11–46. Removal. a. Remove windshield wiper blade from wiper blade and arm assembly (2, figure 11–5). Cut lock wire and remove bolt securing arm assembly to shaft of converter (1). Remove arm.

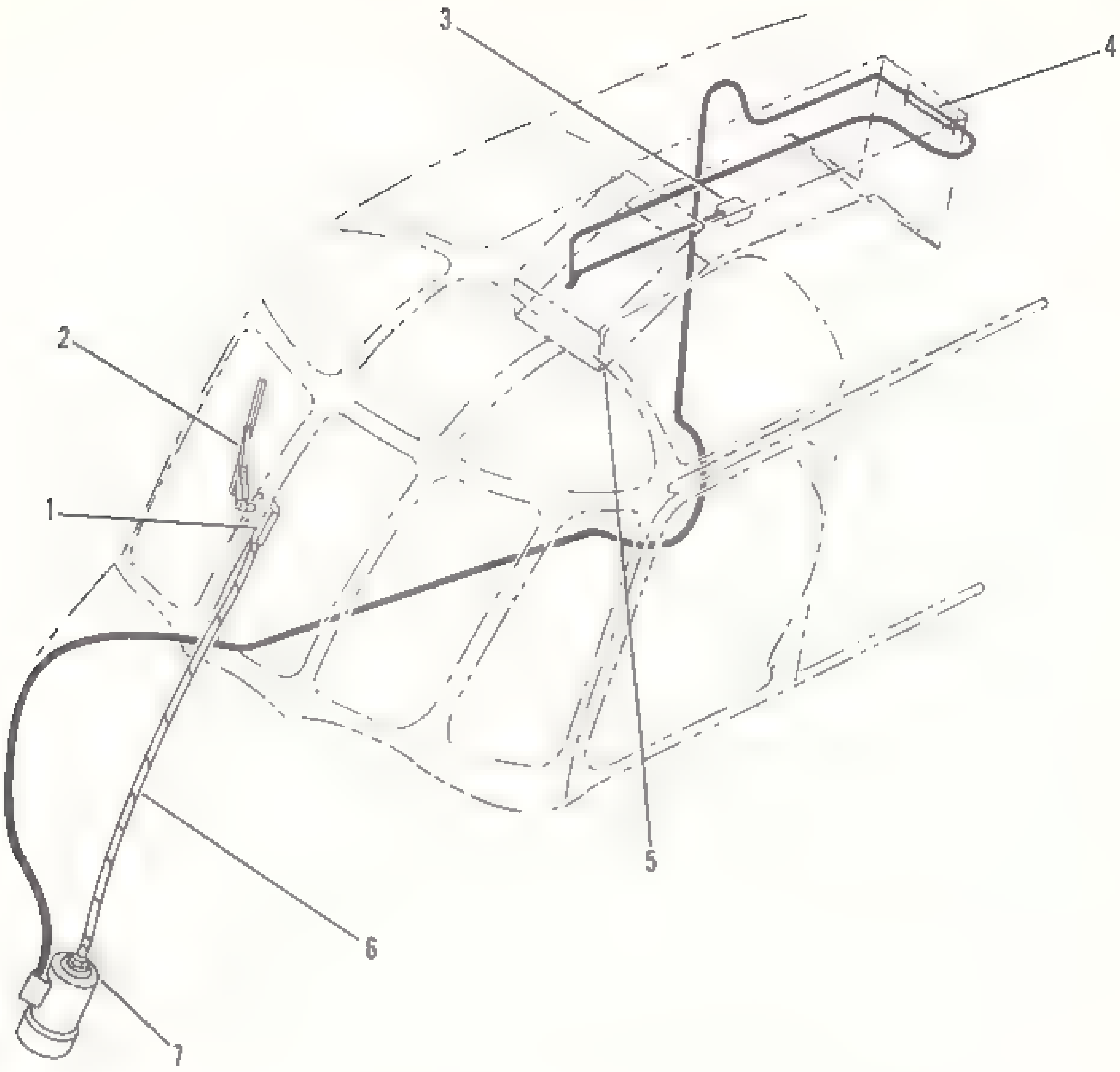
b. Remove instrument panel cowl. Disconnect flexible drive (6) at converter (1) and motor (7). Remove screw and washer securing clamp around flexible drive. Remove clamp and flexible drive.

c. Remove nuts, washers, and bolts securing converter (1) to bracket. Remove converter.

d. Disconnect electrical wiring from motor (7). Cut lock wire and remove bolts and washers securing motor to bracket. Remove motor.

11–47. Cleaning. a. Clean wiper blade with a clean, lint-free cloth.

b. Clean metal windshield wiper components with a clean cloth moistened with solvent (item 4, table 1–8).



1. Converter
2. Wiper Blade and Arm Assembly
3. Circuit Breaker
4. Resistors
5. Overhead Control Panel
6. Flexible Drive
7. Motor

Figure 11–5. Windshield wiper system diagram

c. Allow metal components to air-dry. Remove residue by wiping dry with a clean, dry cloth.

11–48. Inspection. a. Inspect wiper blade for tears and deterioration.

b. Inspect all components for cracks, distortion, corrosion, and malformed threads.

11–49. Installation. a. Position motor (7, figure 11–5) on bracket and secure with bolts and washers. Secure bolts with lock wire. Connect electrical wiring to motor.

b. Position converter (1) on bracket and secure with bolts, washers, and nuts.

c. Connect flexible drive (6) to converter (1) and motor (7). Secure both connections with lock wire. Position clamp around flexible drive and secure to post with screw and washer. Replace instrument panel cowl.

Note

For normal operation of windshield wiper, minimum recommended operating bend radius for flexible drive is 6 inches.

d. Secure arm assembly to shaft of converter (1) with bolt. Install wiper blade on arm assembly.

11–50. Adjustment. a. Loosen nut on wiper blade. Adjust blade so centerline of blade is 8 degrees from centerline of arm assembly with outer end of blade above centerline of arm assembly. Tighten nut.

Note

Move arm assembly to horizontal position before adjusting blade.

b. Unbolt and remove wiper blade and arm assembly (2, figure 11–5) from shaft of converter (1). Turn

WINDSHIELD WIPER switch to PARK position and hold until converter shaft stops moving. Turn switch to OFF. Install wiper blade and arm assembly on converter shaft with blade at top of windshield and parallel to left frame of windshield. Secure control arm to shaft with bolt. Lockwire bolt.

c. Move wiper blade and arm assembly (2) to extreme outboard limit of blade travel. Adjust tension screw on arm channel until blade exerts between 1-1/2 and 2 pounds pressure against windshield. Measure tension at tip of arm in a direction perpendicular to windshield surface.

CHAPTER 12

ELECTRICAL SYSTEMS

Section I Scope

12–1. Purpose. The purpose of this chapter is to provide the essential information for maintenance personnel to accomplish organizational maintenance of the electrical system in accordance with the Maintenance Allocation Chart. (Refer to Appendix II.)

12–2. Description. The electrical system consists of direct current, battery, generator, alternating current, and wiring diagram sections. Auxiliary power and inverter system sections are not applicable.

12–3. Electrical Power. Model CH-34A and CH-34C helicopters have two electrical power supply systems, a 28-volt dc power supply system, and an ac power supply system which provides 115 volts ac power. The dc and ac power supply systems are single-wire type with circuit established through the helicopter structure except for the three phase circuits which are two wire type with circuits established through the helicopter structure. Operating control switches for both the dc and ac power supply systems are situated on the main switch panel (2, figure 12–1 or 3, figure 12–2) at the center of the instrument panel. Ground potential is maintained by a static ground wire attached to the left main landing gear leg and axle assembly.

Note

The grounding pin is situated on left main landing gear leg and axle assembly.

12–4. DC Power Supply System. Filtered dc power is supplied by any of three sources: The generator, the battery, or an external power source connected to the external power receptacle. These three dc power supply sources are connected at the power relay junction box to the dc power distribution system. Components of the dc power supply system are: A generator field control relay (15, figure 12–1 or 25, figure 12–2), over-voltage relay (16, figure 12–1 or 28, figure 12–2), a generator (8, figure 12–1, or 10, figure 12–2), an ammeter and voltmeter situated on the instrument panel, ammeter shunt (9, figure 12–1 or 11, figure 12–2), a battery (22, figure 12–1, or 26, figure 12–2), and an external power receptacle (10, figure 12–1, or 1, figure 12–2). (See figure 12–3.)

a. Troubleshooting. For troubleshooting procedures for the dc power supply system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Battery will not hold charge	Charging rate too low	Adjust voltage regulator. (Refer to paragraph 12–106.)
	Level of electrolyte too low	Maintain level of electrolyte 3/8 inch above plates. (Refer to paragraph 72*b*.)
	Battery sulphation (due to habitual undercharging)	Replace battery. (Refer to paragraphs 12–69 and 12–73)
Battery discharged	Charging rate incorrectly set	Adjust voltage regulator. (Refer to paragraph 12–106.)
	Battery idle too long in hot climate	Replace battery. (Refer to paragraphs 12–69 and 12–73.)
	Level of electrolyte below top plates	Add pure distilled water. (Refer to paragraph 12–72*b*.)
	Battery improperly stored before use	Replace battery. (Refer to paragraphs 12–69 and 12–73.)
Excessive corrosion on battery terminals	Charging rate too high	Adjust voltage regulator. (Refer to paragraph 12–106.)
	Electrolyte spilling over	Remove excess with syringe. (Refer to paragraph 12–72.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Battery frozen	Discharged battery	Replace battery. (Refer to paragraphs 12–69 and 12–73.)
Battery consumes excessive water	Charging rate too high	Adjust voltage regulator. (Refer to paragraph 12–106.)
	Cracked battery	Replace battery. (Refer to paragraphs 12–69 and 12–73.)
EXTERNAL POWER CONNECTED, BATT SWITCH IN OFF POSITION, AND GEN SWITCH IN GEN OFF POSITION		
Primary supply circuit not energized	Failure of external power relay	Replace external power relay. (Refer to paragraphs 12–28 and 12–30)
Secondary supply circuit not energized	Failure of ground check relay or of bus-tie relay	Replace as necessary. (Refer to paragraphs 12–20 and 12–22 or 12–24 and 12–26.)
ENGINE NOT OPERATING AND BATT SWITCH IN BATT POSITION (EXTERNAL POWER DISCONNECTED)		
Battery supply circuit not energized	Battery failure	Replace battery. (Refer to paragraphs 12–69 and 12–73.)
Battery supply circuit energized, but not primary supply circuit	Defective battery relay	Replace battery relay. (Refer to paragraphs 12–84 and 12–86.)
ENGINE AT CRUISING SPEED, CLUTCH ENGAGED, BATT SWITCH ON BATT POSITION, AND GEN SWITCH IN GEN POSITION		
Generator failure warning light on and ammeter shows no load	Overvoltage condition	Place GENFRATOR switch momentarily in RESET position.
	Failure of voltage regulator	Replace voltage regulator. (Refer to paragraphs 12–103 and 12–105.)
	Failure of generator field control relay	Replace relay. (Refer to paragraphs 12–113 and 12–115.)
	Failure of reverse current cut-out relay	Replace relay. (Refer to paragraphs 12–117 and 12–119.)
	Generator failure	Replace generator. (Refer to paragraphs 12–89 and 12–93.)
Secondary supply circuit not energized	Failure of bus-tie relay	Replace bus-tie relay. (Refer to paragraphs 12–24 and 12–26.)

1. Radio Fuse and Circuit Breaker Panel
2. Main Switch Panel
3. Control Box Installation (Pilot's Pitch Control)
4. Overhead Switch Panel
5. Fuse and Circuit Breaker Panel
6. Cockpit Dome Light Panel
7. Electrical Relay and Resistor Box
8. Generator
9. Ammeter Shunt
10. External Power Receptacle
11. Power Relay Junction Box
12. Crew Alarm Bell
13. Battery Bus Circuit Breaker Box
14. Voltage Regulator
15. Generator Field Control Relay
16. Overvoltage Relay
17. Light Flasher (Navigation Lights)
18. Autotransformer
19. Interlock Relay
20. Transformer Fuse Panel
21. Inverters
22. Battery
23. Fuel Nozzle Grounding Receptacle
24. Control Console
25. Instrument Panel

Figure 12–1. AC and DC power supply equipment location diagram (helicopters serial No. prior to 56-4313) (Sheet 1 of 2)

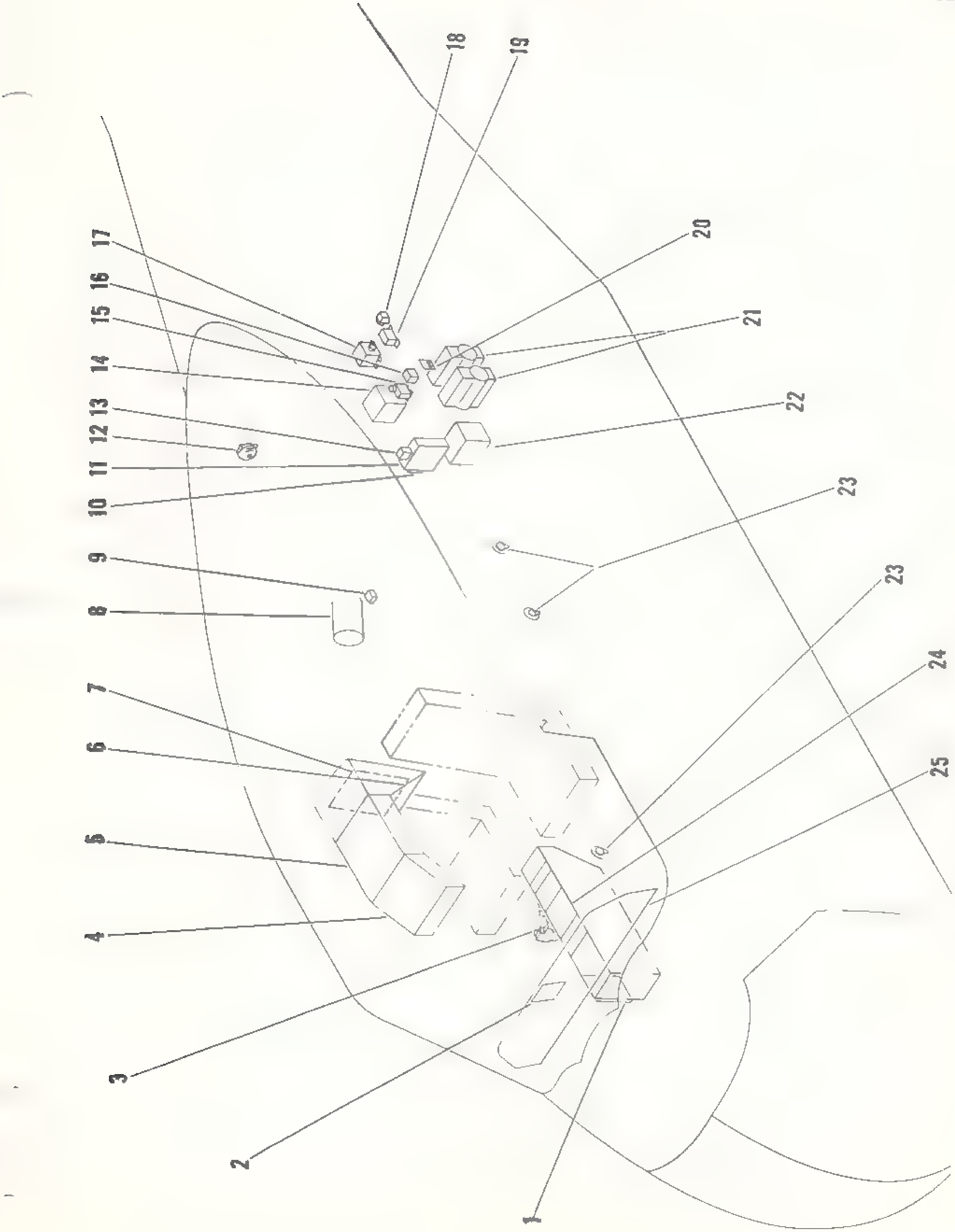


Figure 12-1. AC and DC power supply equipment location diagram (helicopters serial No. prior to 56-4313) (Sheet 2 of 2)

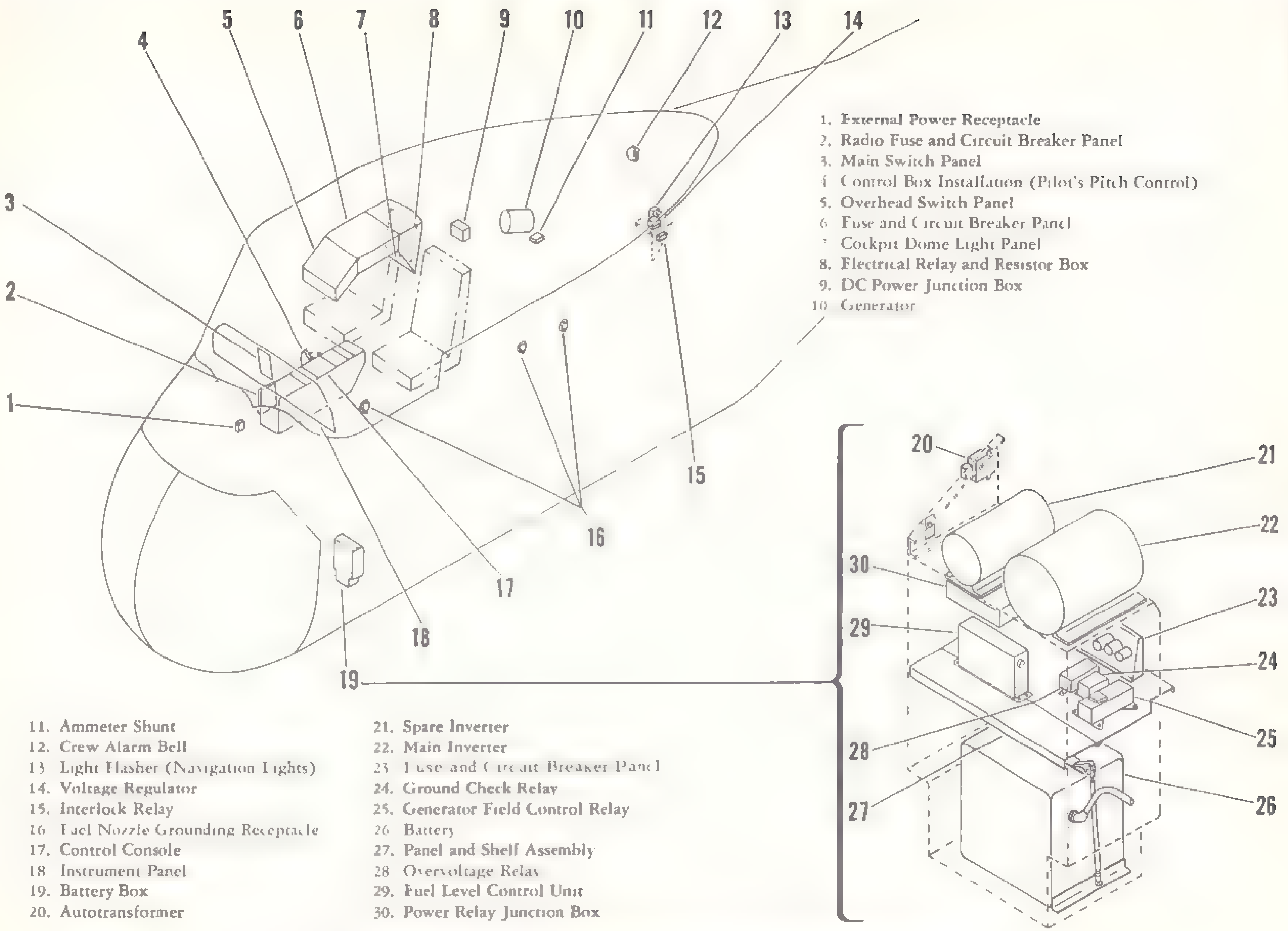


Figure 12–2. AC and DC power supply equipment location diagram (helicopters serial No. 56-4313 and subsequent)

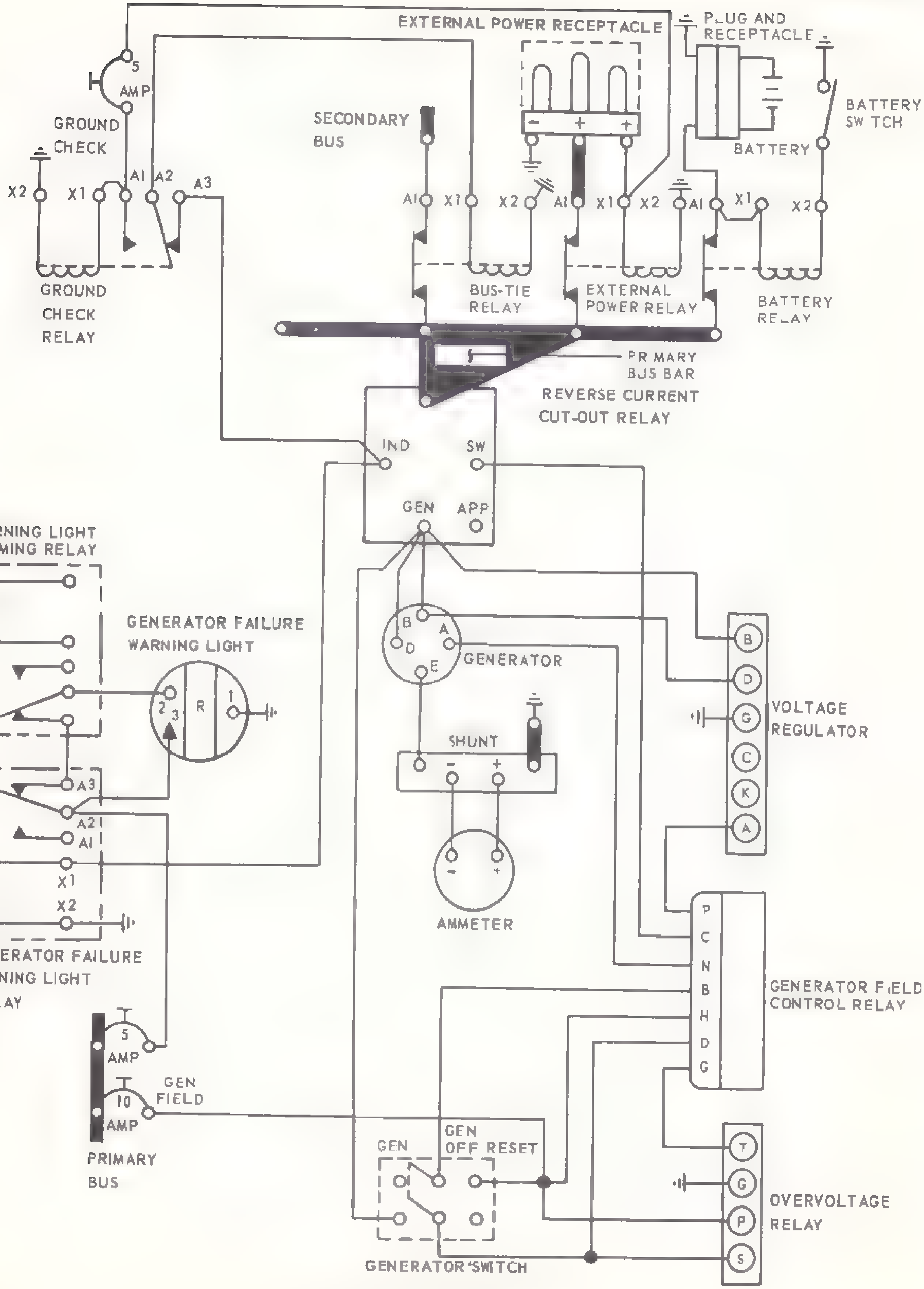
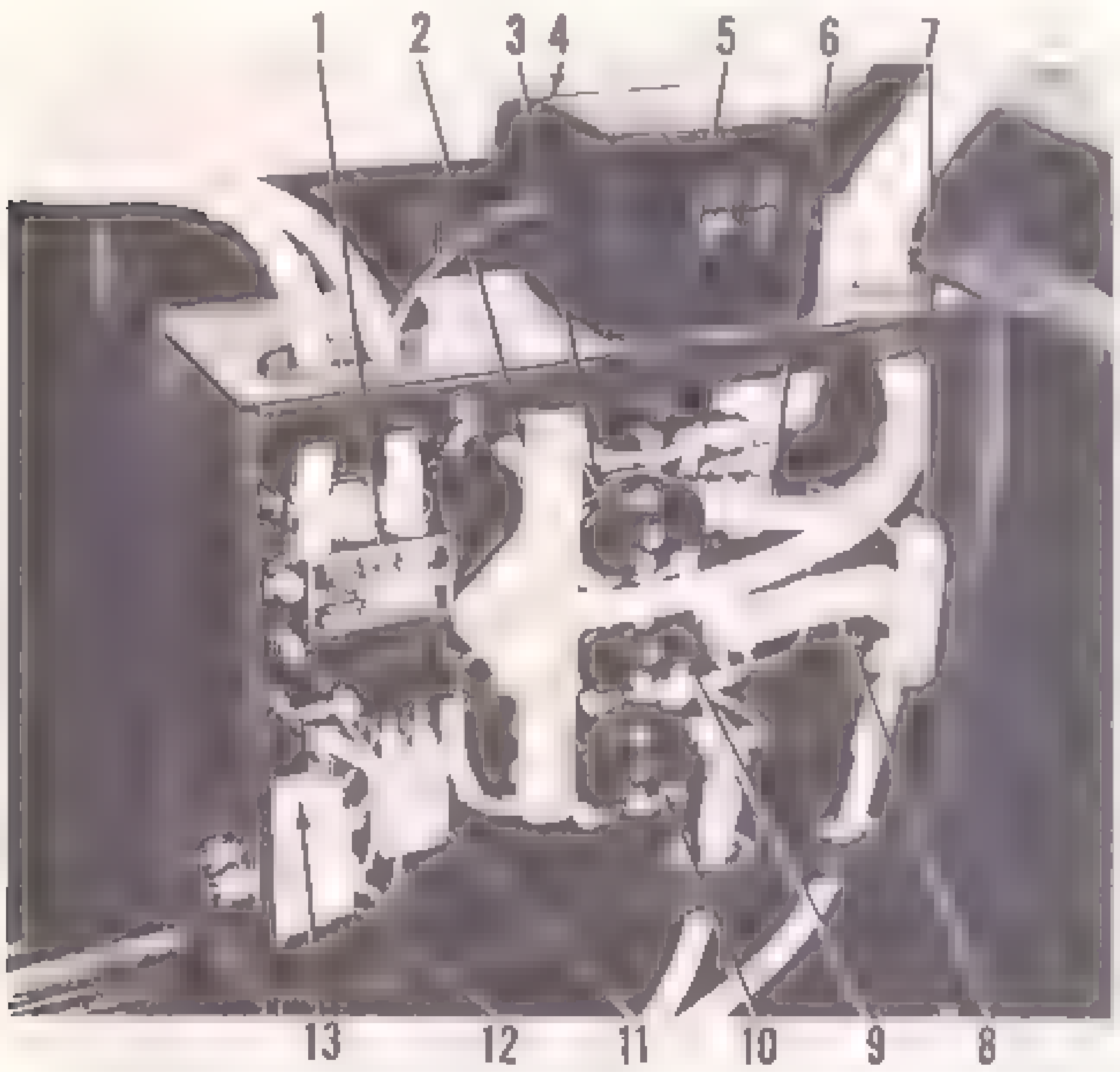


Figure 12–3. Typical DC power supply system

b. Testing. To test dc power system, including both power supply and power distribution systems, start with the engine shut down, the BATT switch in the OFF position, the GEN switch in the GEN OFF position, and external power disconnected.

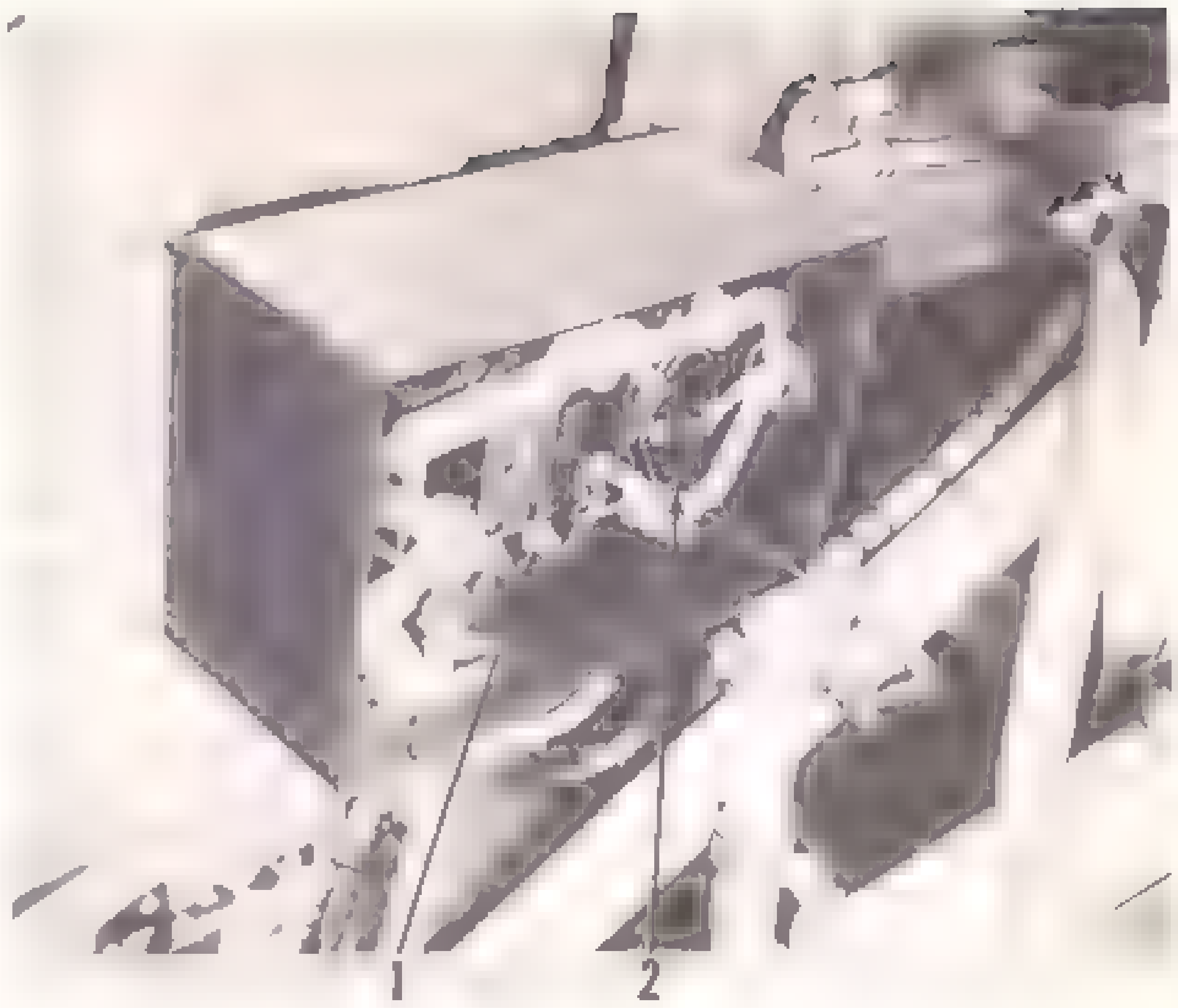
(1) Turn on cockpit dome light. If light comes on, battery supply circuit is operative.

(2) On helicopters serial No. prior to 56-4313, remove cover of power relay junction box (11, figure 12–1) located on right side of forward bulkhead in electronics compartment. On helicopters serial No. 56-4313 and subsequent, remove cover of dc power junction box (9, figure 12–2), located on left side of canted bulkhead in transmission compartment. Connect positive lead of a portable precision voltmeter to BATT terminal of reverse current cut-out relay (1, figure 12–4 or 1, figure 12–5) and the other lead to a good ground (helicopter structure).



1. Reverse Current Cut-Out Relay
2. Primary Bus Bar
3. Bus-Tie Relay
4. Battery Bus Circuit Breaker Box
5. Starter Relay
6. Terminal Strip
7. External Power Receptacle
8. External Power Bus Bar
9. External Power Relay
10. Battery Relay
11. Ground Check Relay
12. Ignition Vibrator Circuit Breaker
13. Ground Check Relay Circuit Breaker

Figure 12–4. Power relay junction box (cover removed) (helicopters serial No. prior to 56-4313)



1. Reverse Current Cut-Out Relay
2. Bus-Tie Relay

Figure 12–5. DC power junction box (cover removed) (helicopters serial No. 56-4313 and subsequent)

(3) Place BATT switch in BATT position. Voltmeter should read approximately 24 volts, indicating that battery relay is working properly, primary supply circuit is energized, and battery is fully charged. The GEN OFF warning light should come on, indicating generator failure warning circuit is operative.

Note

If battery voltage is less than 22 volts, battery must be charged or replaced with a fully charged battery.

(4) Connect an external source of 28-volt dc power to helicopter. Voltmeter reading should increase from 24 to 28 volts, indicating that external power relay is operating properly.

(5) Turn on dome light in electronics compartment. If the light comes on, the secondary supply circuit is energized and both ground check relay and bus-tie relay are operating properly.

(6) With qualified personnel at controls of helicopter, engine running, clutch engaged, BATT switch in BATT position, and GEN switch in GEN position, increase engine speed to cruising rpm. Voltmeter reading should increase from 24 volts to 28.0 + 0.25 volts. These indications show that voltage regulator, overvoltage relay, generator field control relay, and reverse current cut-out relay are operating properly. The GEN OFF warning light should go out as voltmeter reading increases, indicating that generator failure warning light relay is operating properly.

(7) Shut down engine and place BATT switch in OFF position. Be sure external power is not connected.

(8) Disconnect and remove portable precision voltmeter from junction box and replace cover of junction box.

Warning

Short circuits in junction box may cause fires that would damage equipment or injure personnel. Be sure no foreign objects are left in junction box and that all connections are properly made and are secure.

12–5. AC Power Supply System. The ac power is supplied by two inverters (main and spare), which operate from the 28-volt dc power system. Through the FLT INST INV – MAIN – OFF – SPARE inverter switch, located on the main switch panel (2, figure 12–1 or 3, figure 12–2), either inverter (main or spare) may be energized separately, but not simultaneously. (See figure 12–6.) The ac voltage control system is electronics and selfcontained in the inverters (main and spare). Inverter failure is indicated by the FLT INST INV – FAILURE warning light in the ac power distribution system. (Refer to paragraph 12–137.)

a. Testing. To test the ac power supply system, the 28-volt dc primary circuit must be energized. As the inverters (main and spare) draw a relatively heavy current, external power should be used when testing ac power supply system.

(1) With FLT INST INV switch in OFF position, check that FLT INST INV – FAILURE warning light comes on when 28-volt dc primary supply circuit is engaged.

(2) Place FLT INST INV switch in MAIN position and then in SPARE position. If FLT INST INV – FAILURE warning light goes off in both cases, inverters (main and spare) are both in operating condition.

(3) With FLT INST INV switch in MAIN position and then in SPARE position, test voltage output in all 115-volt ac power distribution circuits (paragraph 12–137) with an ac voltmeter. If voltage output of either inverter (main or spare) is not within range of 115 + 3 volts, adjust inverter voltage output (paragraph *b*). If all phases fail to come within these limits, replace faulty inverter(s).

(4) Test 26-volt output of autotransformer to be sure autotransformer is operating properly.

(5) Place FLT INST INV switch in OFF position and disconnect external power.

b. Adjustment. Prior to installation, the voltage output of the inverters (main and spare) are adjusted to 115 + 3 volts under load. If testing (paragraph *a*) indicates voltage output is outside the tolerance limits, adjust by means of the voltage adjustment screws on the inverters (main and spare).

12–6. Wire Identification. Each electrical wire in the helicopter is identified by a letter-number code which is reflected throughout the wiring diagrams. This code signifies the circuit function and includes the wire number, segment, and size, respectively.

12–7. Electrical Connectors. Plugs and receptacles are located throughout the helicopter to provide a means of connecting panels and individual components to the helicopter electrical system and to facilitate their removal and installation. All electrical connectors (with the exception of quick disconnect types) in engine compartment, areas of high vibration (excluding those on shock-mounted equipment), and in areas not accessible for periodic inspection of the helicopter, must have the coupling secured with lock wire or otherwise mechanically locked to prevent opening of the connector due to vibration.

12–8. Removal. a. Place MASTER switch in OFF position. Disconnect battery and external power.

b. Disconnect any connector bonding or lock wire. Disconnect electrical connector at mating plug or receptacle.

c. Disassemble electrical connector to expose pin terminals.

d. Slide insulated sleeves back over wires and disconnect wires.

Note

Tag and identify electrical wiring to aid in installation.

12–9. Inspection. a. Inspect electrical connector for cracks, distortion, and malformed threads.

b. Inspect electrical connector for burned contacts, corrosion, signs of arcing, and damaged insulator.

12–10. Installation. a. Place MASTER switch in OFF position. Disconnect battery and external power.

b. Remove identifying tags and connect wires to electrical connectors. Slide insulating sleeves back over connections.

c. Reassemble electrical connector and check for continuity and short circuits. Check that resistance between pins is infinite, except where pins are connected in parallel.

d. Connect electrical connector to mating plug or receptacle. Connect any connector bonding or lockwire as applicable.

12–11. Lockwired Electrical Connectors. At all electrical connectors (with the exception of quick disconnect types) in the engine compartment, in areas of high vibration (excluding those on shock mounted equipment), and in areas not accessible for periodic inspection, the coupling nut shall be lockwired or otherwise mechanically locked to prevent opening of the connector due to vibration.

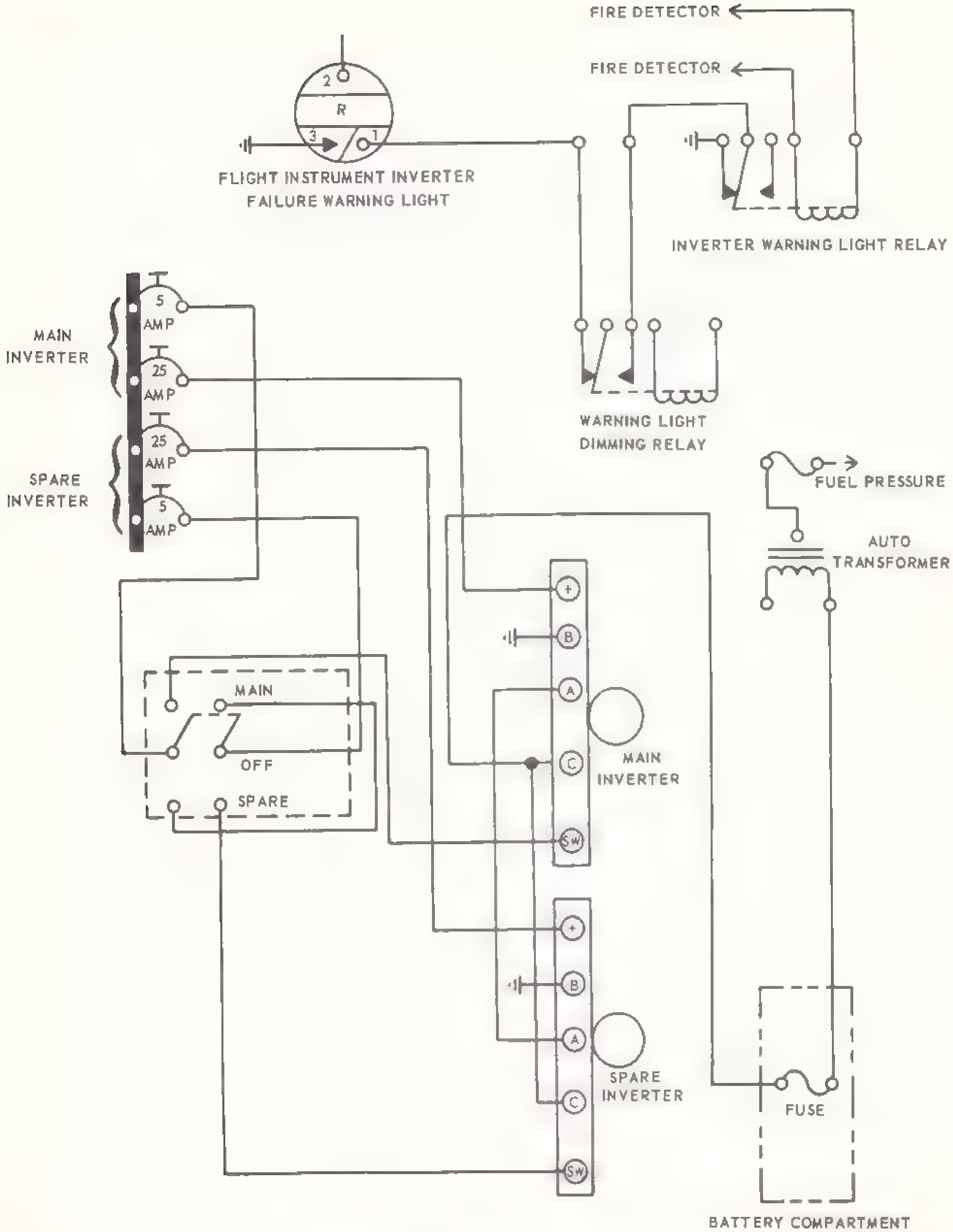


Figure 12–6. Typical AC power supply system

12–12. Soldered Connections. For all soldering operations, use solder (item 44, table 1–8).

12–13. Electrical Equipment List. Paragraph 12–153 contains a complete list of electrical equipment and components used on all helicopters.

Section II Direct Current

12–14. Description. The direct current section consists of the dc power distribution system, ground check relay, bus-tie relay, external power relay, external power receptacle, main switch panel, overhead control panel, dc circuit breakers, lighting provision, exterior lights, interior lights, warning light dimming relay, and magnetic brake system, forward and aft (force gradient) installation.

12–15. DC Power Distribution System. The dc power distribution system consists of a battery supply circuit, a primary supply circuit, and a secondary supply circuit. Except for the battery supply circuit, the dc power distribution system is controlled by the BATT switch, the GEN switch, and five relays: The battery relay, the reverse current cut-out relay, the ground check relay, the bus-tie relay, and the external power relay. Controlling switches are located on the main switch panel on the instrument panel and on the overhead switch panel of the overhead control panel. Protective circuit breakers are located on the fuse and circuit breaker panel of the overhead control panel. The battery supply circuit connects directly to the battery and is always energized. Table 12–1 presents a summary of operating conditions for the dc power distribution system.

12–16. Battery Supply Circuit. The battery supply circuit consists of a battery bus bar connected directly to the battery and through the contacts of the battery relay to the primary supply circuit. On helicopters serial No. prior to 56-4313, the battery bus bar is located in the battery bus circuit breaker box (4, figure 12–4) which is secured to the top of the power relay junction box, located on the forward bulkhead of the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the battery bus bar is located on the back of the fuse and circuit breaker panel (23, figure 12–2) in the battery box (19). On helicopters serial No. prior to 56-4313, the circuit breakers connected to the battery bus bar are mounted on the front of the battery bus circuit breaker box and are appropriately marked to indicate the circuits they protect. On helicopters serial No. 56-4313 and subsequent, the circuit breakers connected to the battery bus bar are mounted on the fuse and circuit breaker panel and are appropriately marked to indicate the circuits they protect. When only battery power is available, the cir-

Table 12–1. DC power distribution — operating conditions

EXTERNAL POWER SOURCE	GENERATOR SWITCH POSITION	BATTERY SWITCH POSITION	BATTERY SUPPLY CIRCUIT	PRIMARY SUPPLY CIRCUIT	SECONDARY SUPPLY CIRCUIT
DISCONNECTED	GEN OFF	OFF	Energized	Not energized	Not energized
		BATT	Energized	Energized	Not energized
	*GEN	OFF	Energized	Energized	Energized
		BATT	**Energized	Energized	Energized
CONNECTED	GEN OFF or GEN	OFF	Energized	Energized	Energized
		BATT	***Energized	Energized	Energized

*Assuming generator at operating speed (engine speed at least 1400 rpm and clutch engaged).

**Energized by generator power and battery is charging

***Energized by external power and battery is charging.

cuit is continuously energized from the battery. When external or generator power is available and the BATT switch is ON, the circuit is energized from the dc primary supply circuit and the battery is charging. The battery supply circuit supplies power to equipment of either a convenience or an emergency nature which may be operated regardless of the positions of the BATT and GEN switches or the availability of external or generator power. (Refer to tables 12–1 and 12–2.)

12–17. Primary Supply Circuit. On helicopters serial No. prior to 56-4313, the primary supply circuit consists of two interconnected bus bars, one mounted on the back of the fuse and circuit breaker panel (5, figure 12–1) in the cockpit and the other in the power relay junction box (11) in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the primary supply circuit consists of three interconnected bus bars, one mounted on the back of the fuse and circuit breaker panel (6, figure 12–2) in the cockpit, a second mounted in the dc power junction box (9, figure 12–2) on the left side of the canted bulkhead in the transmission compartment, and the third in the power relay junction box (30, figure 12–2) secured to the top of the battery box. The bus in the power relay junction box connects to external power through the external power relay (paragraph 12–27) to battery power through the contacts of the battery relay (paragraph 12–83) and to generator power through the reverse current cut-out relay (paragraph 12–116). (Refer to tables 12–1 and 12–2.)

12–18. Secondary Supply Circuit. The secondary supply circuit consists of a single bus bar connected through the contacts of the bus-tie relay to the primary supply circuit from which it is energized. In normal flight operations, with the GEN switch in the GEN position, the secondary supply circuit is energized, except in case of generator failure. Generator failure is indicated by the generator failure warning light. (Refer to paragraph 12–120.) With the clutch disengaged or the engine not running, the secondary supply circuit can be energized only through the application of external power. (Refer to table 12–1.) The secondary supply circuit provides power to equipment which is not essential to flight operations and would overload the battery in event of generator failure, but use of which may be necessary or convenient during ground operations. The secondary bus bar is located on the back of the overhead panel and is connected to operating equipment circuits through appropriately marked circuit breakers on the fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2). (Refer to tables 12–1 and 12–2.)

Table 12–2. DC equipment – supply circuit connections

BATTERY	PRIMARY	SECONDARY
Cockpit Dome Light, Cockpit Trouble Light, and Inspection Lights	Carburetor Air Temperature Indicator	Cabin Dome Lights and Trouble Light
Crew Alarm and Electronics Compartment Barrier Release	Cargo Sling	Cabin Heater
	Clutch Pump	Cargo Floodlight
	Cylinder Head Temperature Indicator	Electronics Compartment Dome Light
	Engine Oil Temperature Indicator	Formation Lights
	Fire Detector System	Landing Light
	Fuel Pumps (Transfer and Booster)	Navigation Lights
	Generator Field	Rotating Light
	Ignition Vibrator	Stick Trim
	Instrument Lights	
	Inverters (Input and Relay)	
	Panel and Console Lights	
	Pitot Heat Tube	
	Servo (Hydraulic)	
	Starter, Engine Primer, and Oil Dilution	
	Radio Master	
	Transmission Oil Temperature Indicator	

12—19. Ground Check Relay. On helicopters serial No. prior to 56-4313, the ground check relay (11, figure 12—4) is located in the power relay junction box which is secured to the right side of the forward bulkhead in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the ground check relay (24, figure 12—2) is located on the panel and shelf assembly in the battery box. The ground check relay alternately connects the solenoid of the bus-tie relay to generator output or to external power. When external power is not connected, the solenoid of the ground check relay is not energized and the contacts of the relay connect the solenoid of the bus-tie relay to generator output from the IND terminal of the reverse current cut-out relay. When external power is connected, the solenoid of the ground check relay is energized and the relay contacts connect the solenoid of the bus-tie relay to external power. The arrangement makes it possible to ground check electrical equipment connected to the secondary supply circuit when generator output is not available.

12—20. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. prior to 56-4313, release fasteners and remove cover from power relay junction box (11, figure 12—1) in electronics compartment. On helicopters serial No. 56-4313 and subsequent, remove cover from fuse and circuit breaker panel (23, figure 12—2). Release catch on each side of panel and shelf assembly (27) and lower panel and shelf assembly.

Warning

Short circuits may cause fires that would damage equipment or injure personnel. Before removing ground check relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

c. Disconnect electrical wires from ground check relay (11, figure 12—4 or 24, figure 12—2).

d. Remove screws and washers securing ground check relay. Remove ground check relay.

12—21. Inspection. Inspect ground check relay for corrosion, cracks, damaged terminals, loose or damaged components, and indications of overheating, arcing, or burning.

12—22. Installation. a. On helicopters serial No. prior to 56-4313, position ground check relay (11, figure 12—4) in power relay junction box located in electronics compartment. On helicopters serial No. 56-4313 and subsequent, position ground check relay (24, figure 12—2) on panel and shelf assembly in battery box.

Warning

Short circuits may cause fires that would damage equipment or injure personnel. Before installing ground check relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

b. Secure ground check relay in position with screws and washers. Connect electrical wires to proper terminals on ground check relay.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

c. On helicopters serial No. prior to 56-4313, install cover on power relay junction box (11, figure 12—1) and secure with fasteners. On helicopters serial No. 56-4313 and subsequent, raise panel and shelf assembly (27, figure 12—2) into level position and secure. Install cover and secure with fasteners.

Warning

Short circuits may cause fires that would damage equipment or injure personnel. Before replacing cover, be sure all electrical connections are properly made and that no foreign objects are left in junction box.

d. Connect battery.

12—23. Bus-Tie Relay. The bus-tie relay connects the secondary supply circuit to the primary supply circuit when either generator power or external power is available. The solenoid of the bus-tie relay is energized alternately by either generator output or external power through the contacts of the ground check relay. On helicopters serial No. prior to 56-4313, the bus-tie relay (3, figure 12—4) is located in the power relay junction box on the right side of the forward bulkhead of the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the bus-tie relay (2, figure 12—5) is in the dc power junction box located on the left side of the canted bulkhead in the transmission compartment.

12—24. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. prior to 56-4313, release fasteners and remove cover from power relay junction box (11, figure 12—1) in electronics compartment. On

helicopters serial No. 56-4313 and subsequent, release fasteners and remove cover from dc power junction box (9, figure 12–2) on left side of canted bulkhead in transmission compartment.

Warning

Short circuits in power relay junction box may cause fires that would damage equipment or injure personnel. Before removing cover, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

c. Remove nuts and washers securing primary bus bar. Remove primary bus bar and brass washers.

d. Disconnect electrical wires from bus-tie relay (3, figure 12–4 or 2, figure 12–5).

e. Remove screws and washers securing bus-tie relay. Remove bus-tie relay.

12–25. Inspection. Inspect bus-tie relay for corrosion, cracks, damaged terminals, loose or damaged components, and indications of overheating, arcing, or burning.

12–26. Installation. a. On helicopters serial No. prior to 56-4313, position bus-tie relay (3, figure 12–4) in power relay junction box located in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, position bus-tie relay (2, figure 12–5) in dc power junction box located on left side of canted bulkhead in transmission compartment.

Warning

Short circuits may cause fires that would damage equipment or injure personnel. Before installing bus-tie relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and battery and external power source are disconnected.

b. Secure bus-tie relay in position with screws and washers and connect electrical wires to proper terminals on bus-tie relay.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

c. Install brass washers and primary bus bar and secure with washers and nuts.

Note

If there are variations in height of relays in power relay junction box, build up lower relays with AN 961-616 washers and AN 341-616 nuts, as required.

d. On helicopters serial No. prior to 56-4313, install cover on power relay junction box (11, figure 12–1) and secure with fasteners. On helicopters serial No. 56-4313 and subsequent, install cover on dc power junction box (9, figure 12–2) and secure with fasteners.

Warning

Short circuits in power relay junction box may cause fires that would damage equipment or injure personnel. Before installing cover, be sure all electrical connections are properly made and that no foreign objects are left in power relay junction box.

e. Connect battery.

12–27. External Power Relay. On helicopters serial No. prior to 56-4313, the external power relay (9, figure 12–4) is located in the power relay junction box on the right side of the forward bulkhead of the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the external power relay (4, figure 12–7) is located on the panel and shelf assembly in the battery box. The external power relay connects the external power receptacle to the primary supply circuit when external power is connected.

12–28. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. prior to 56-4313, release fasteners and remove cover from power relay junction box (11, figure 12–1) in electronics compartment. On helicopters serial No. 56-4313 and subsequent, remove cover from fuse and circuit breaker panel (23, figure 12–2). Release catch on each side of panel and shelf assembly (27) and lower panel and shelf assembly.

Warning

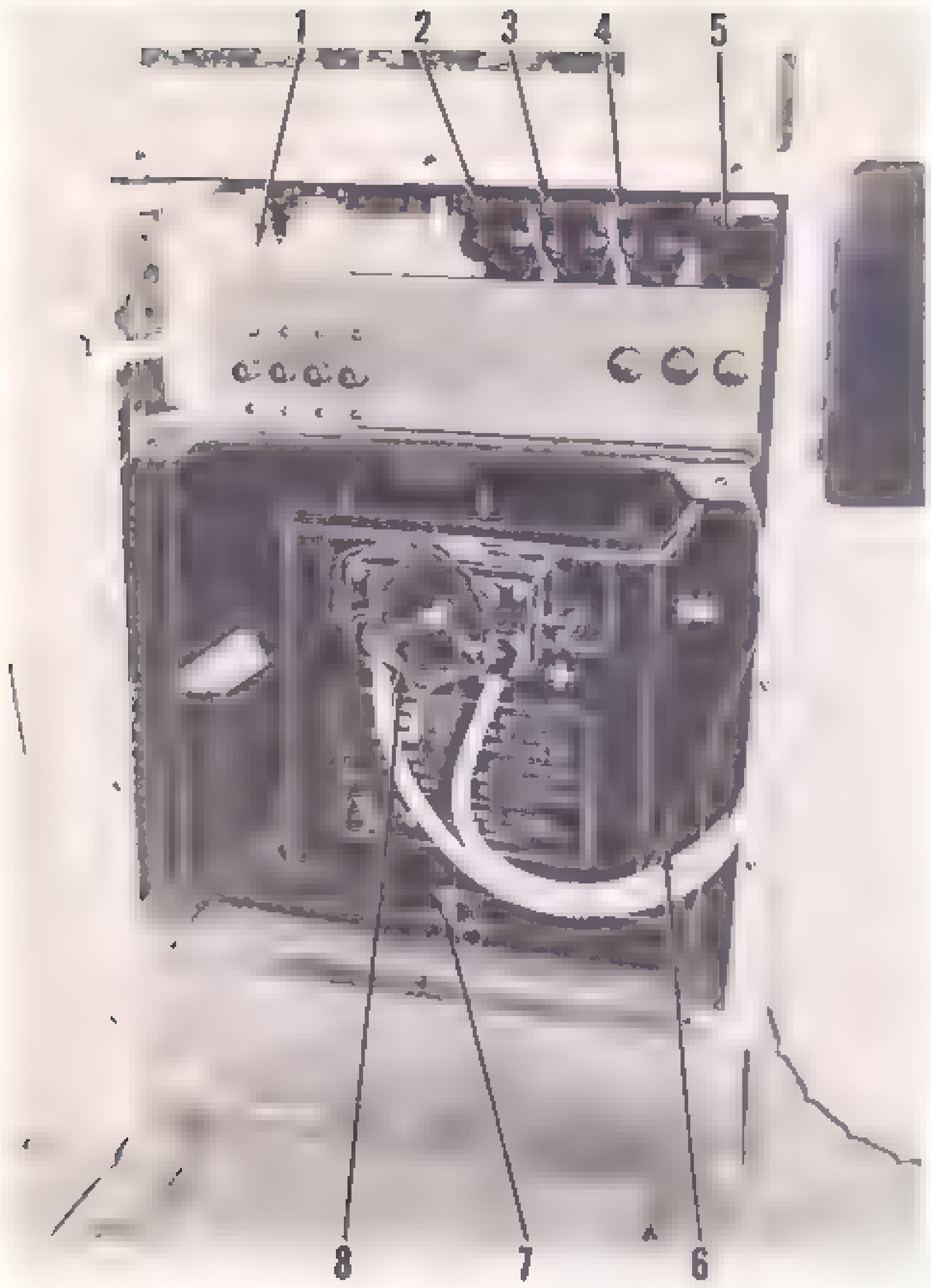
Short circuits may cause fires that would damage equipment and personnel. Before removing external power relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

c. Remove nuts and washers securing primary and external power bus bars to external power relay (9, figure 12–4 or 4, figure 12–7). Remove primary and external power bus bars, and brass washers.

d. Disconnect electrical wires from external power relay.

e. Remove screws and washers securing external power relay. Remove external power relay.

12–29. Inspection. Inspect external power relay for corrosion, cracks, damaged terminals, loose or dam-



1. Generator Field Control Relay
2. Starter Relay
3. Battery Relay
4. External Power Relay
5. Fuse and Circuit Breaker Panel
6. Battery
7. Retaining Pin
8. Quick Disconnect Battery Plug

Figure 12–7. Battery box electrical components installation (helicopters serial No. 56-4313 and subsequent)

aged components, and indications of overheating, arcing, or burning.

12–30. Installation. a. On helicopters serial No. prior to 56-4313, position external power relay (9, figure 12–4) in power relay junction box located in electronics compartment. On helicopters serial No. 56-4313 and subsequent, position external power relay (4, figure 12–7) on panel and shelf assembly in battery box.

Warning

Short circuits may cause fires that would damage equipment or injure personnel. Before installing external power relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and battery and external power source are disconnected.

b. Secure external power relay in position with screws and washers. Connect electrical wires to proper terminals on external power relay.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

c. Install brass washers and primary and external power bus bars; secure with nuts and washers.

Note

If there are variations in height of relays in power relay junction box, build up lower relays with AN 961-616 washers and AN 341-616 nuts, as required.

d. On helicopters serial No. prior to 56-4313, install cover on power relay junction box (11, figure 12–1) and secure with fasteners. On helicopters serial No. 56-4313 and subsequent, raise panel and shelf assembly (27, figure 12–2) into level position and secure. Install cover and secure with fasteners.

e. Connect battery.

12–31. External Power Receptacle. (See figure 12–8 or 12–9.) On helicopters serial No. prior to 56-4313, the external power receptacle (10, figure 12–1) is attached to the right side of the power relay junction box, located on the forward bulkhead of the electronics compartment. On helicopters serial

Figure 12–8. External power receptacle (helicopters serial No. prior to 56-4313)

Figure 12–9. External power receptacle (helicopters serial No. 56-4313 and subsequent)

No. 56-4313 and subsequent, the external power receptacle (1, figure 12–2) is located on the right side of the helicopter just aft of the air intake screens. The external power receptacle is accessible from the outside of the helicopter through an access door. The external power receptacle provides means for connecting an external source of 28-volt dc power to the helicopter's dc power distribution system. (Refer to paragraph 12–15.) When external power is not connected, the external power receptacle is not energized. The external power receptacle has three contact pins, two positive and one negative. The negative pin is grounded to the helicopter structure. One positive pin connects to the solenoids of both the ground check relay and the external power relay. (Refer to paragraphs 12–19 and 12–27.) The other positive pin connects to the primary bus through the contacts of the external power relay.

12–32. *Inspection.* *a.* Inspect contact pins for corrosion, misalignment, and indications of arcing or burning.

b. Inspect external power receptacle for security.

c. Inspect electrical cables and wires for worn or damaged insulation; inspect power bus bar for security.

12–33. Main Switch Panel. The main switch panel (figure 12–10 or 12–11) is located on the instrument panel (25, figure 12–1 or 18, figure 12–2). The main switch panel contains toggle switches and warning lights. The toggle switches are marked, FIRE DET TEST OFF, FLT INST INV MAIN OFF SPARE, FUEL BSTR PUMP OFF, WARN LTS BRT OFF, ENG PRM OFF OIL DIL or OFF OIL DIL, GEN GEN OFF RESET, and BATT OFF. The warning lights are marked FIRE DET WARN, FUEL TRANS OVERFLOW, LT ON 20 MIN FUEL, ROTOR BK ON, and GEN OFF.

12–34. *Toggle Switch (Typical).* The toggle switches located on the main switch panel (12–10 or 12–11) are of the one-hole mounting, MS type with a keyway to insure proper installation. The toggle switches control and/or test various electrical components.

a. Removal. (1) Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Release fasteners securing main switch panel to instrument panel. Pull main switch panel out from instrument panel.

Warning

Short circuits in main switch panel may cause fires that would damage equipment or injure personnel. Before pulling main switch panel from instrument panel, insure that battery and external power source are disconnected.

(3) Disconnect electrical wires from terminals of toggle switch.

(4) Remove nut and washer securing toggle switch to main switch panel. Remove toggle switch and guard (if installed).

b. Inspection. Inspect toggle switch for corrosion, thread damage, bent or broken terminals, indications of arcing, and proper toggle operation.

c. Installation. (1) Position toggle switch and guard (if required) on main switch panel and secure with nut and washer.

(2) Connect electrical wires to proper terminals on toggle switch.

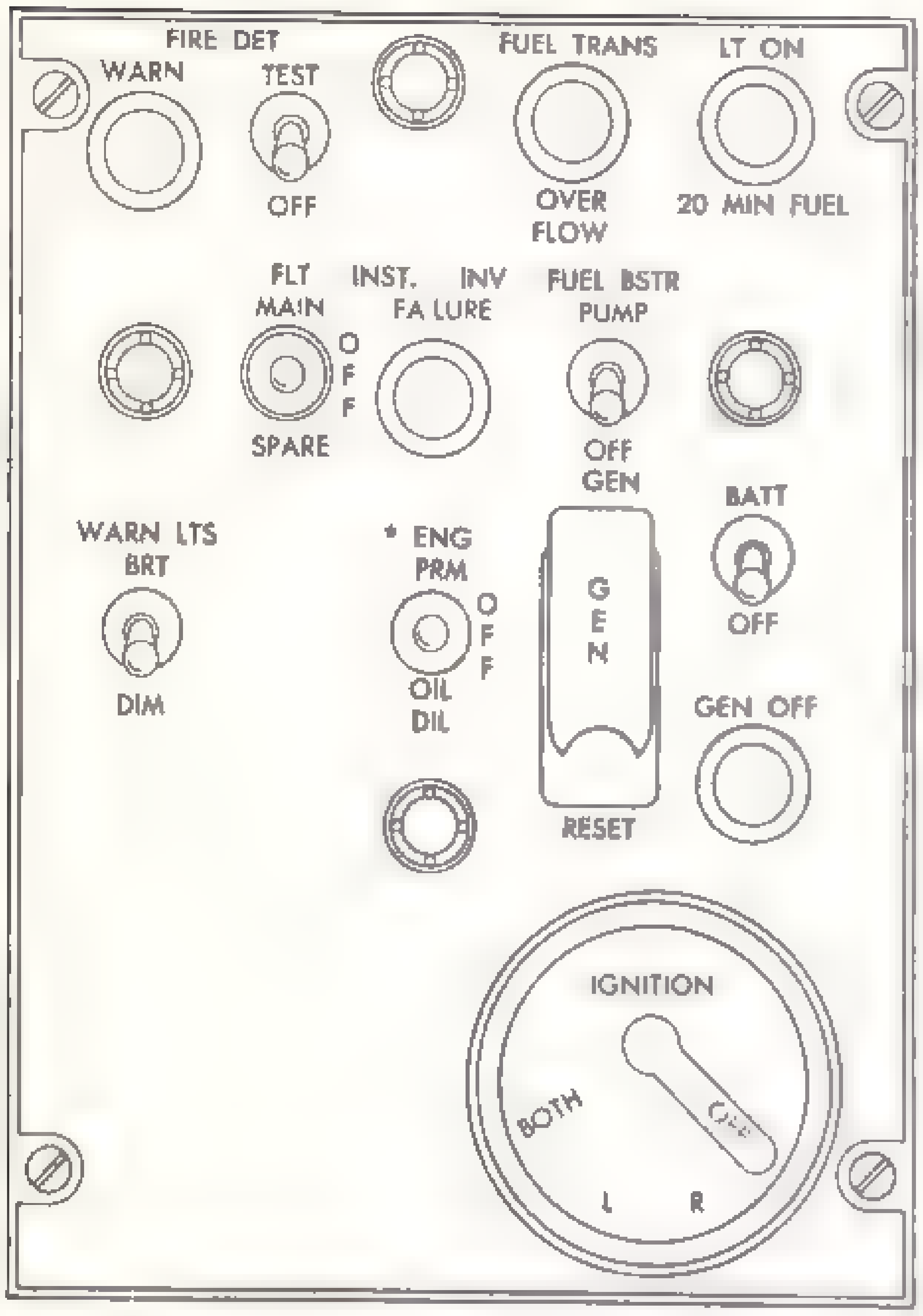
Note

For correct electrical wire connections, refer to applicable wiring diagram.

(3) Position main switch panel in instrument panel and secure with fasteners.

Warning

Short circuits in main switch panel may cause fires that would damage equipment or injure personnel. Before positioning main switch panel in place, be sure all electrical connections are properly made and that no foreign objects are left in main switch panel.



* ON HELICOPTERS SERIAL NO. 54-2862 AND SUBSEQUENT SWITCH IS MARKED "OFF-OIL DIL"

Figure 12–10. Main switch panel (helicopters serial No. prior to 55-4462)

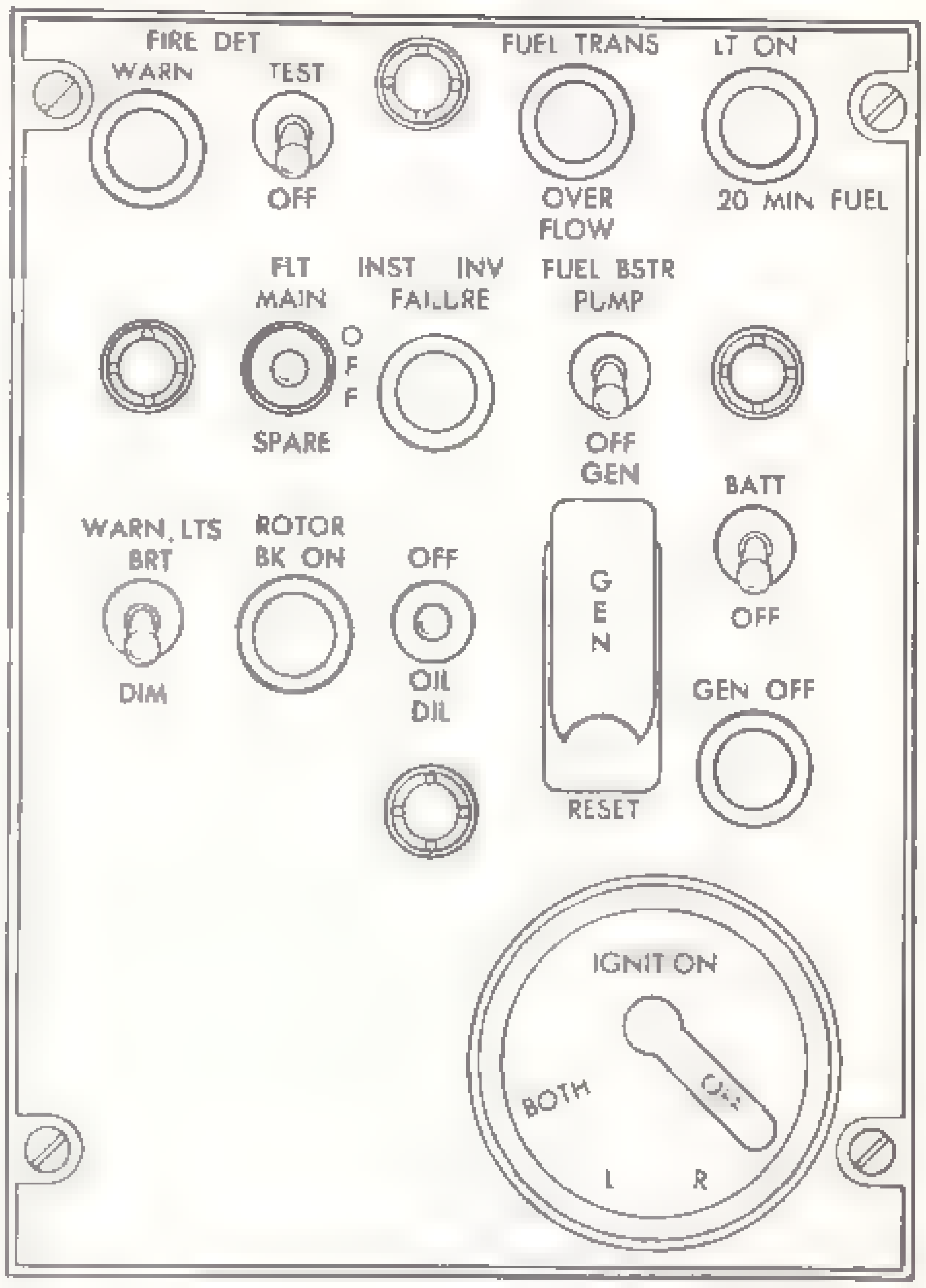


Figure 12–11. Main switch panel (helicopters serial No. 55-4462 and subsequent)

(4) Connect battery.

12–35. Warning Light (Typical). The warning lights located on the main switch panel (12–10 or 12–11) are of the press-to-test, red lens, MS type. The warning lights are dimmed by placing the WARN LTS switch, located on the main switch panel, in the DIM position.

a. Removal. (1) Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery from battery terminals and disconnect external power source from external power receptacle.

(2) Release fasteners securing main switch panel to instrument panel. Pull main switch panel out from instrument panel.

Warning

Short circuits in main switch panel may cause fires that would damage equipment or injure personnel. Before pulling main switch panel from instrument panel, insure that battery and external power source are disconnected.

(3) Disconnect electrical wires from terminals 1, 2, and 3 on warning light.

Note

Use a suitable soldering iron to melt solder at electrical wire connections.

(4) Remove nut and washer securing warning light to main switch panel. Remove warning light.

(5) Remove lamp by removing lens cap and disengaging lamp from light socket.

b. Inspection. Inspect warning light for corrosion, cracks, distortions, damaged or broken terminals, damaged threads, and cracked or broken lens.

c. Installation. (1) Install lamp in light socket and secure with lens cap.

(2) Position warning light on main switch panel and secure with nut and washer.

(3) Connect electrical wires to proper terminals 1, 2, and 3 on warning light, using approved soldering method.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(4) Position main switch panel in instrument panel and secure with fasteners.

Warning

Short circuits in main switch panel may cause fires that would damage equipment or injure personnel. Before positioning main switch panel in place, be sure all electrical connections are properly made and that no foreign objects are left in main switch panel.

(5) Connect battery.

12–36. Overhead Control Panel. The overhead control panel (figure 12–12, 12–13, and 12–14) is installed in the center of the cockpit ceiling. The overhead control panel contains the overhead switch panel (4, figure 12–1 or 5, figure 12–2), the fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2), and the cockpit dome light panel (6, figure 12–1 or 7, figure 12–2). Each panel is hinged along one edge and can be lowered to allow access to the rear of the panel and the interior of the overhead control panel box. The electrical relay and resistor box (7, figure 12–1 or 8, figure 12–2) forms the aft section of the overhead control panel and supports the cockpit dome light panel. Figures 12–15, 12–16, and 12–17 shows the components that are mounted inside the electrical relay and resistor box.

12–37. Overhead Switch Panel. The overhead switch panel (4, figure 12–1 or 5, figure 12–2) is located on the overhead control panel. The overhead switch panel contains toggle switches and rotary switches. The toggle switches and rotary switches are appropriately marked as shown in figures 12–12, 12–13, and 12–14.

a. Toggle switch (typical). The toggle switches, located on the overhead switch panel, are of the one-hole mounting, MS type with a keyway to insure proper installation. The toggle switches control the electrical components as marked. (See figures 12–12, 12–13, and 12–14.)

(1) *Removal. (a)* Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(b) Release fasteners and hinge down overhead switch panel.

Warning

Short circuits in overhead switch panel may cause fires that would damage equipment or injure personnel. Before hinging down overhead switch panel, insure that battery and external power source are disconnected.

(c) Disconnect electrical wires from terminals of toggle switch.

(d) Remove nut and washer securing toggle switch to overhead switch panel. Remove toggle switch and guard (if installed).

(2) *Inspection.* Inspect toggle switch for corrosion, thread damage, bent or broken terminals, indications of arcing, and proper toggle operation.

(3) *Installation. (a)* Position toggle switch and guard (if required) on overhead switch panel and secure with nut and washer.

(b) Connect electrical wires to proper terminals on toggle switch.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(c) Hinge up overhead switch panel and secure with fasteners.

Warning

Short circuits in overhead switch panel may cause fires that would damage equipment or injure personnel. Before hinging up overhead switch panel, be sure all electrical connections are properly made and that no foreign objects are left in overhead switch panel.

(d) Connect battery.

b. Rotary switch (typical). The five rotary switches located on the overhead switch panel are of the one-hole mounting type with a keyway to insure proper installation. The rotary switches are marked WINDSHIELD WIPER PARK OFF FAST MED SLOW, INST FLD LTS OFF BRT, CONSOLE & PANEL LTS OFF BRT, NON FLT INST LTS OFF BRT, and FLT INST LTS OFF BRT. The rotary switches control the electrical components as marked.

(1) *Removal. (a)* Perform procedures as outlined in paragraph *a*(1), steps *(a)* and *(b)*.

(b) Disconnect electrical wires from terminals of rotary switch.

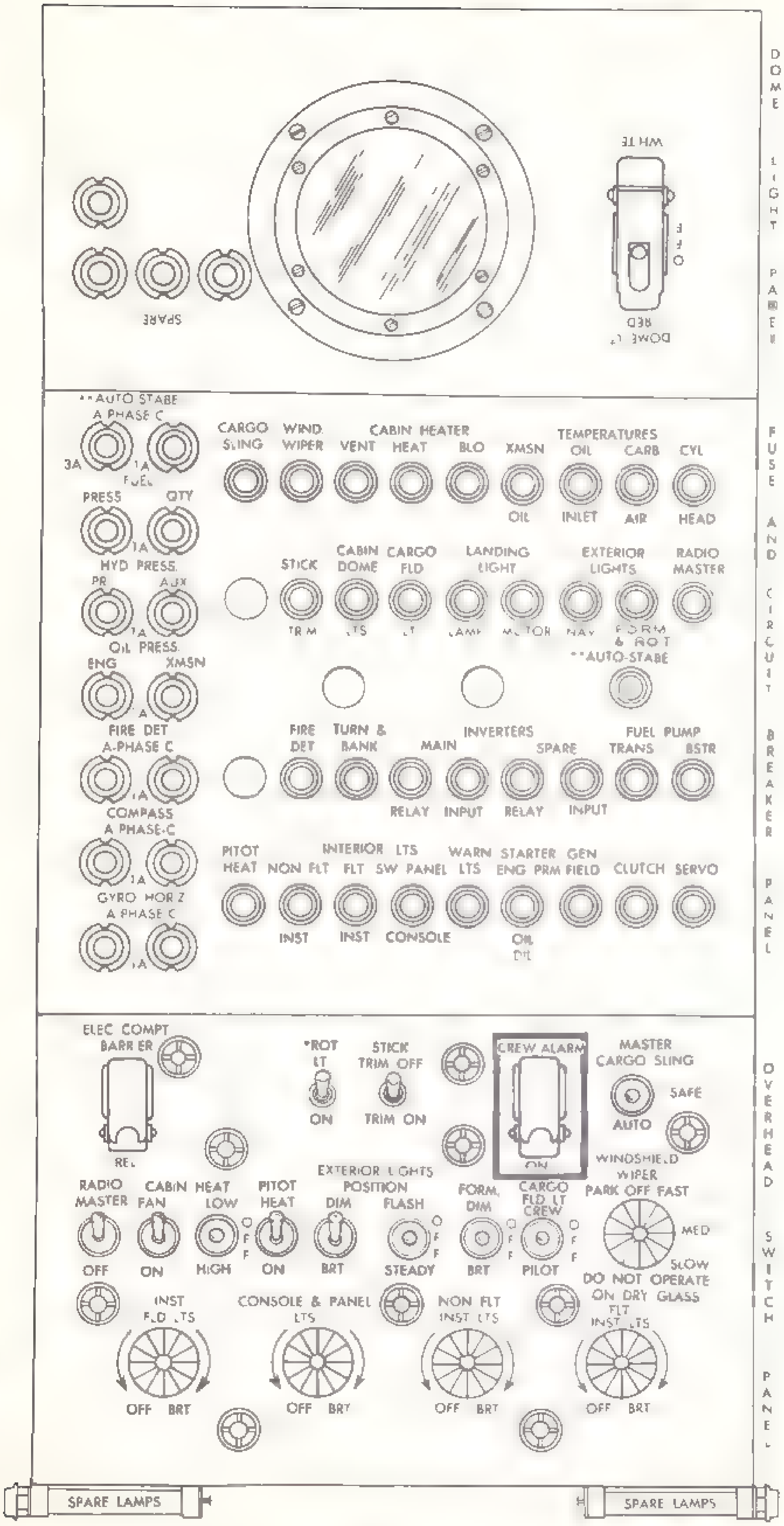
(c) Remove setscrew securing control knob to actuating shaft of rotary switch. Remove control knob.

(d) Remove nut and washer securing rotary switch to overhead switch panel. Remove rotary switch.

(2) *Inspection.* Inspect rotary switch for corrosion, thread damage, damaged terminals, indications of arcing, and proper operation of actuating shaft.

(3) *Installation. (a)* Position rotary switch on overhead switch panel and secure with nut and washer.

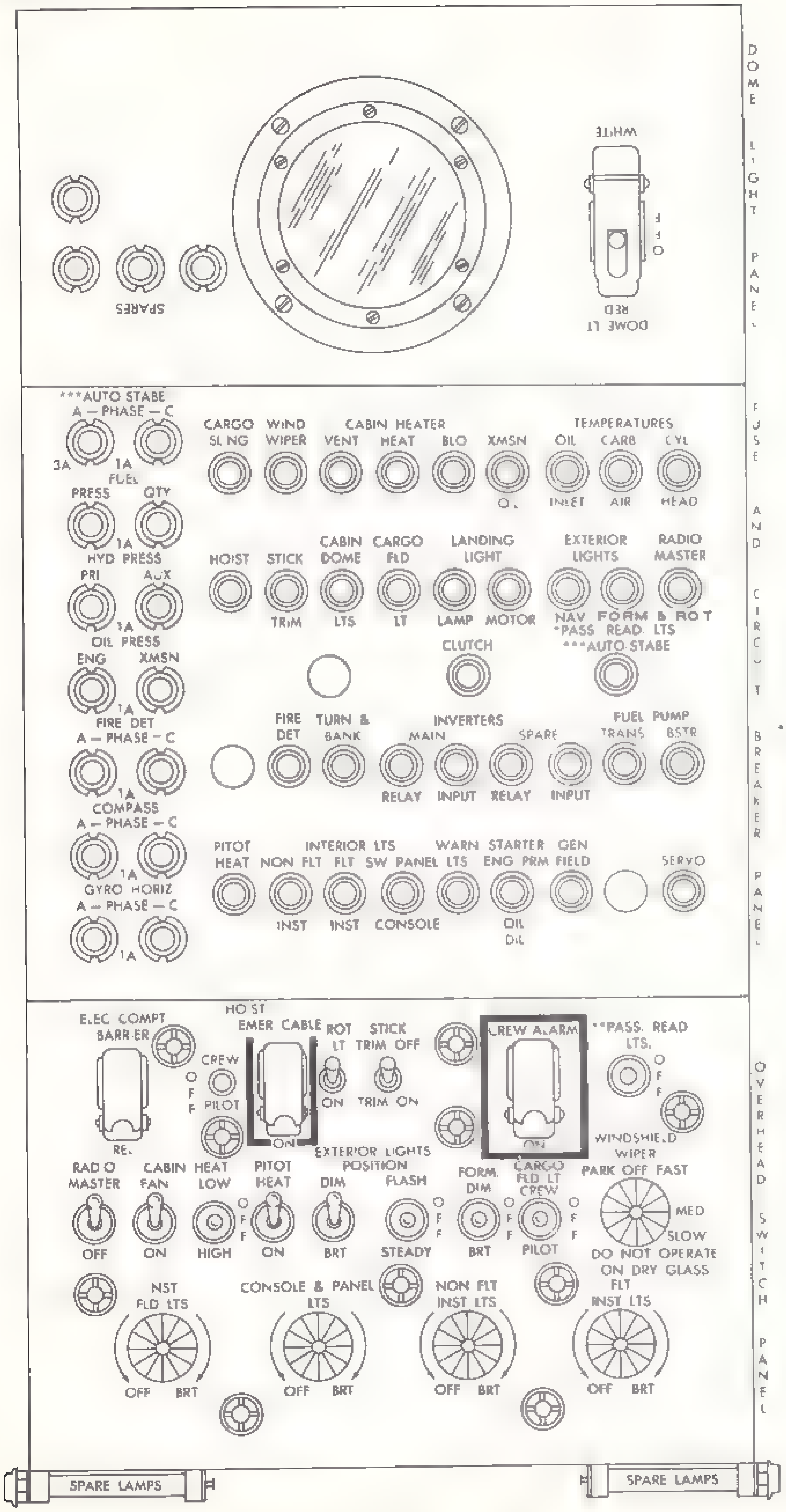
(b) Install control knob on actuating shaft of rotary switch and secure with setscrew.



*HELICOPTERS SERIAL NO. 54-3008 AND SUBSEQUENT

**HELICOPTERS SERIAL NO. 56-4317 AND SUBSEQUENT

Figure 12—12. Overhead control panel (helicopters serial No. prior to 56-4284)



*HELICOPTERS SERIAL NO. 56-4284 THROUGH 56-4312
**HELICOPTER SERIAL NO. 56-4315
***HELICOPTERS SERIAL NO. 56-4317 AND SUBSEQUENT

Figure 12—13. Overhead control panel (helicopters serial No. 56-4284 through 57-1741)

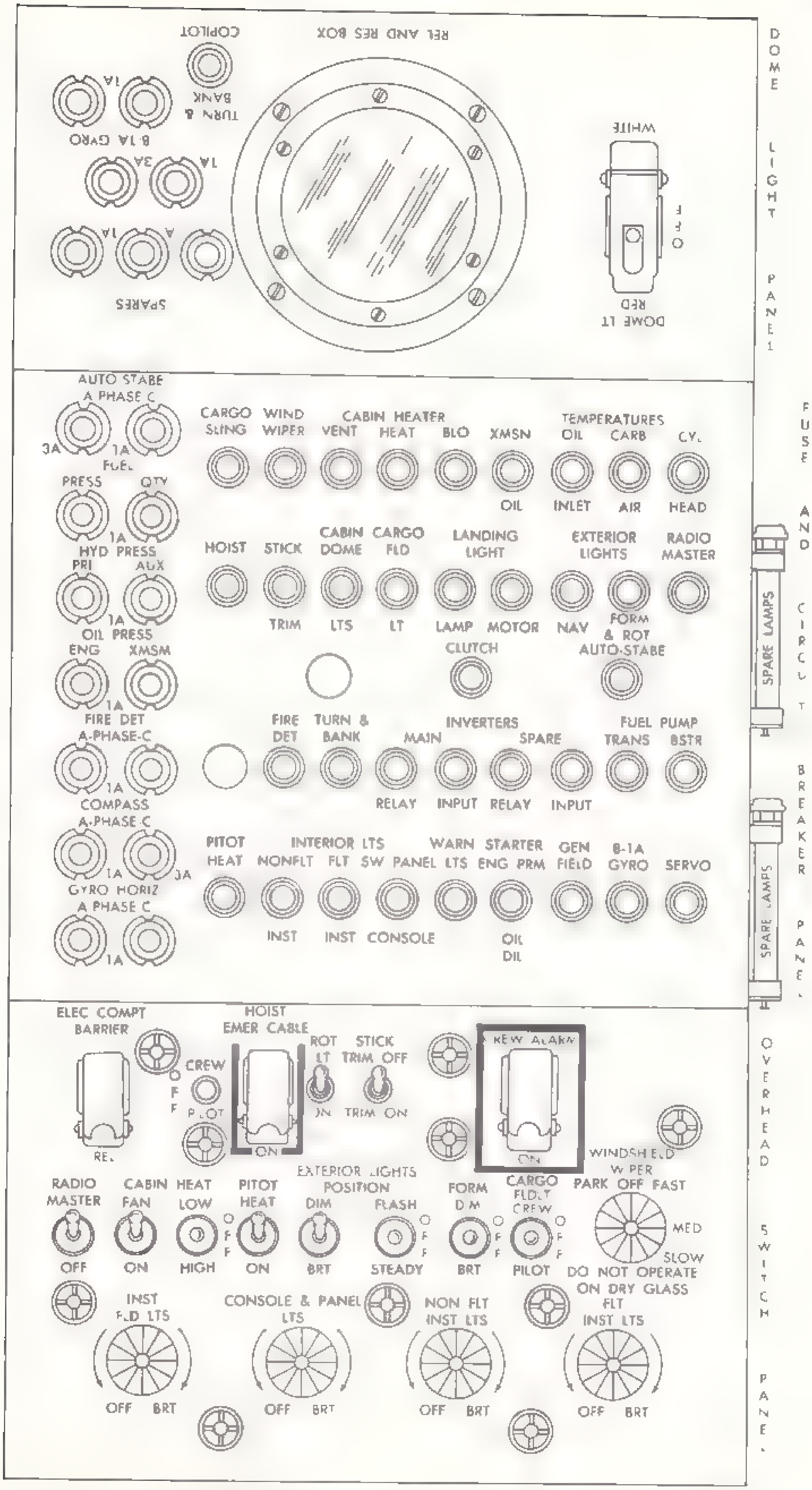
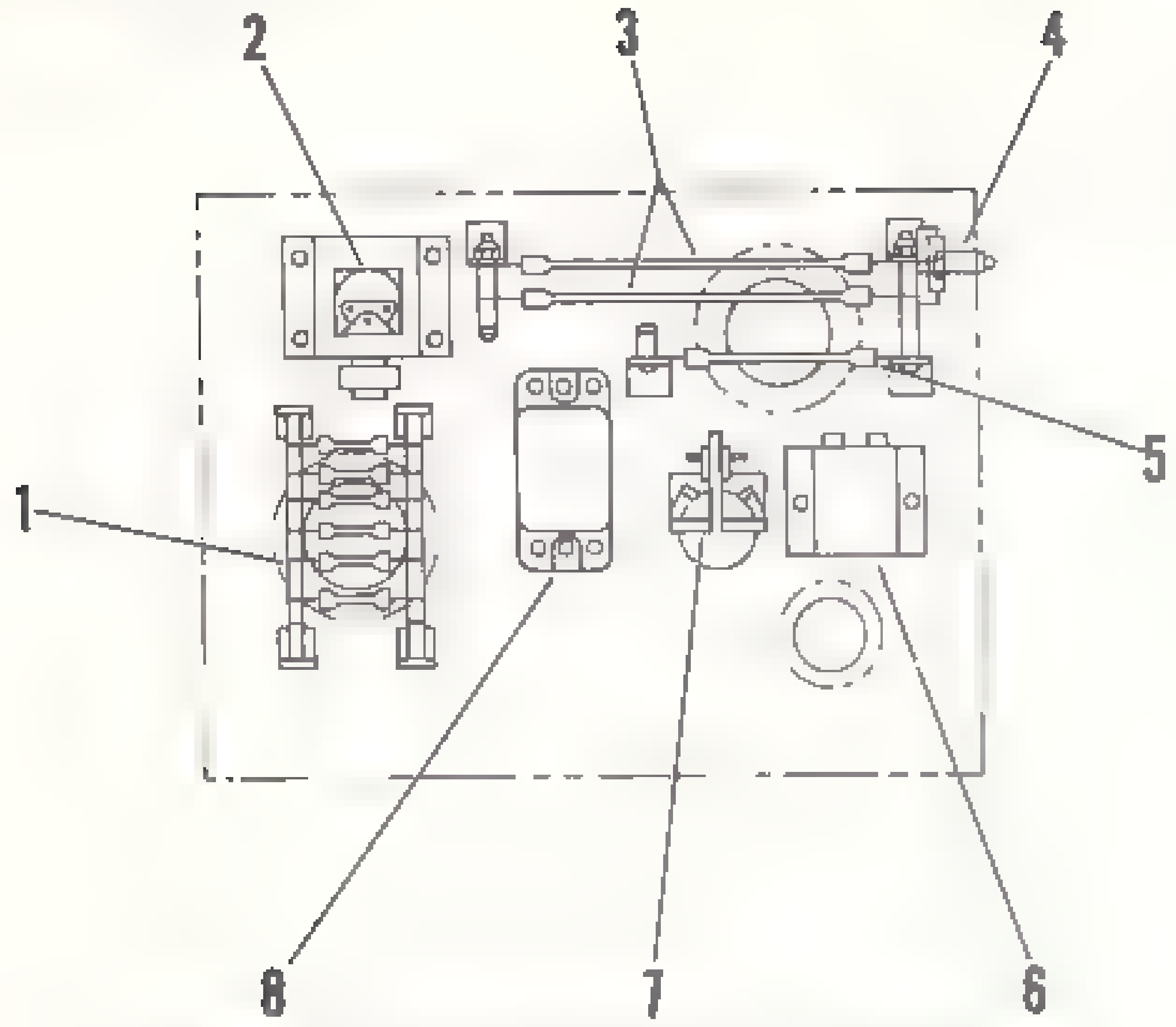
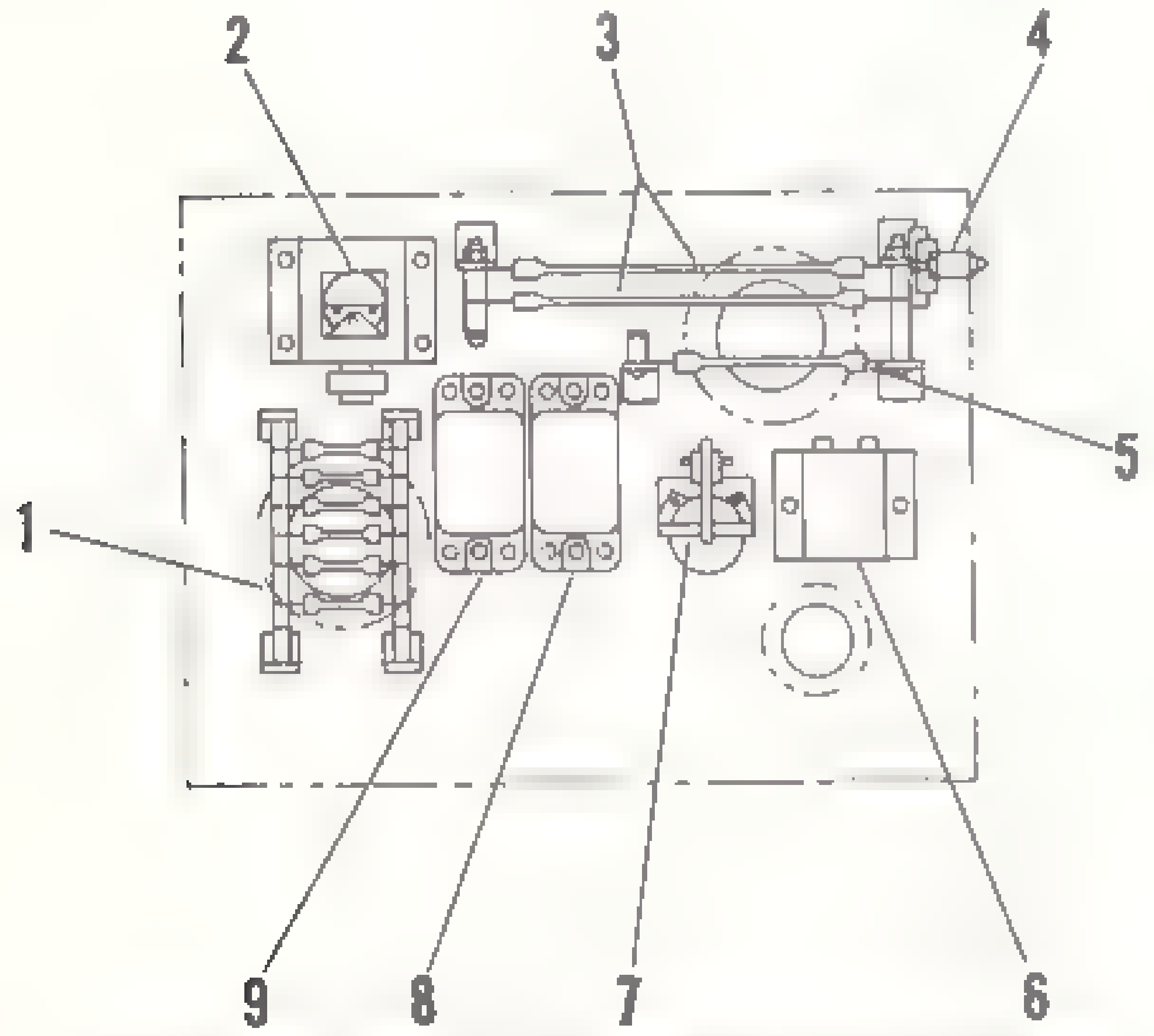


Figure 12–14. Overhead control panel (helicopters serial No. 57-1742 and subsequent)



1. Dimming Resistors (Warning and Fuselage Lights)
2. Warning Light Dimming Relay
3. Resistors (Windshield Wiper)
4. Dimming Resistor (Formation Lights)
5. Dimming Resistor (Position Lights)
6. Generator Failure Warning Light Relay
7. Inverter Failure Warning Light Relay
8. Cargo Sling Relay

Figure 12–15. Relays and resistors (overhead control panel) (helicopters serial No. prior to 55-4462)



1. Dimming Resistors (Warning and Fuselage Lights)
2. Warning Light Dimming Relay
3. Resistor (Windshield Wiper)
4. Dimming Resistor (Formation Lights)
5. Dimming Resistor (Position Lights)
6. Generator Failure Warning Light Relay
7. Inverter Failure Warning Light Relay
8. Clutch Pump or Diverter Valve Relay
9. Cargo Sling Relay

Figure 12–16. Relays and resistors (overhead control panel) (helicopters serial No. 55-4462 through 57-1741)

(c) Connect electrical wires to proper terminals on rotary switch.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(d) Perform procedures as outlined in paragraph *a*(3), steps *(c)* and *(d)*.

12–38. DC Circuit Breakers. All dc operating circuits are protected by appropriately marked circuit breakers. When a circuit breaker opens from an overload, it can normally be reset by pushing in the plunger. If the circuit breaker continues to pop out, trouble is indicated somewhere within that particular circuit and an investigation should be conducted to isolate and correct the difficulty. Circuit breakers in the primary and secondary supply circuits are located on the fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2) on the overhead control panel (figure 12–12, 12–13, and 12–14). On helicopters serial No. prior to 56-4313, the crew alarm and cockpit dome light circuit breakers are located in a circuit breaker cover on battery bus circuit breaker box (13, figure 12–1) in the electronics compartment. The ground check relay circuit breaker (13, figure 12–4) and the ignition vibrator circuit breaker (12) are located on the left side of the power relay junction box (11, figure 12–1) in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the crew alarm and cockpit dome light circuit breakers in the battery supply circuit, the ground check relay circuit breaker, and the ignition vibrator circuit breaker are located on the fuse and circuit breaker panel (5, figure 12–7) on the panel and shelf assembly in the battery box (19, figure 12–2).

12–39. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

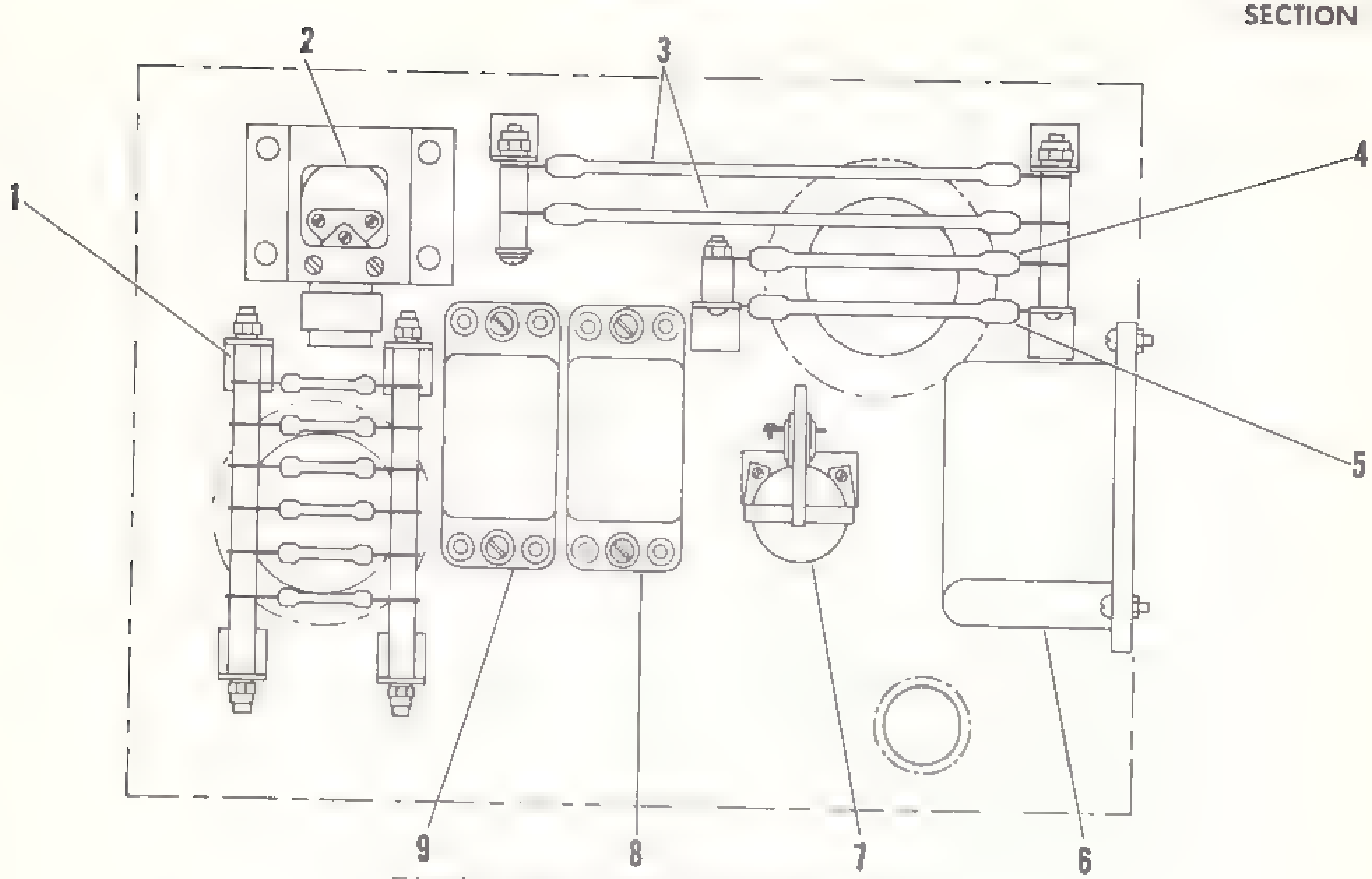
b. Gain access to circuit breaker electrical wires and bus bar, as follows:

Warning

Short circuits in junction boxes and panels may cause fires that would damage equipment and injure personnel. Before removing covers or opening panels, insure that battery leads and external power source are disconnected.

(1) Release fasteners and hinge down fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2) to gain access to circuit breakers in the primary and secondary supply circuits.

(2) On helicopters serial No. prior to 56-4313, remove screws securing circuit breaker cover to battery



1. Dimming Resistors (Warning and Fuselage Lights)
2. Warning Light Dimming Relay
3. Resistor (Windshield Wiper)
4. Dimming Resistor (Formation Lights)
5. Dimming Resistor (Position Lights)
6. Generator Failure Warning Light Relay
7. Inverter Failure Warning Light Relay
8. Diverter Valve Relay
9. Cargo Sling Relay

Figure 12–17. Relays and resistors (overhead control panel) (helicopters serial No. 57-1742 and subsequent)

bus circuit breaker box (13, figure 12–1) and pull circuit breaker cover from battery bus circuit breaker box to gain access to crew alarm and cockpit dome light circuit breakers.

(3) On helicopters serial No. prior to 56-4313, remove cover from power relay junction box (11, figure 12–1) to gain access to ground check relay circuit breaker (13, figure 12–4) and ignition vibrator circuit breaker (12).

(4) On helicopters serial No. 56-4313 and subsequent, remove cover from fuse and circuit breaker panel (5, figure 12–7). Release catch on each side of panel and shelf assembly (27, figure 12–2) and lower panel and shelf assembly to gain access to crew alarm, cockpit dome lights, ground check relay, and ignition vibrator circuit breakers.

c. Determine circuit breaker that is to be removed and disconnect electrical wires and bus bar from terminals of circuit breaker.

d. Remove screws securing circuit breaker to panel or cover. Remove circuit breaker.

12–40. Inspection. Inspect circuit breaker for corrosion, bent or broken terminals, damaged threads, cracked or broken plunger, and indications of overheating, arcing, or burning.

12–41. Installation. a. Position circuit breaker on panel or cover and secure with screws.

b. Connect electrical wires and bus bar to circuit breaker.

Note

For correct electrical wire and bus bar connections, refer to applicable wiring diagram.

c. Install covers and secure panels, as follows:

Warning

Short circuits in panels or junction box may cause fires that would damage equipment or injure personnel. Before installing cover or securing panels, be sure all electrical connections are properly made and that no foreign objects are left in panels or junction box.

(1) On helicopters serial No. 56-4313 and subsequent, raise panel and shelf assembly (27, figure 12–2) into level position and secure. Install cover and secure with fasteners.

(2) On helicopters serial No. prior to 56-4313, install cover on power relay junction box (11, figure 12–1) and secure with fasteners.

(3) On helicopters serial No. prior to 56-4313, install circuit breaker cover on battery bus circuit breaker box (13, figure 12–1) and secure with screws.

(4) Hinge up fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2) and secure with fasteners.

d. Connect battery.

12–42. Lighting Provisions. Lighting provisions include both exterior and interior lights. (See figure 12–18.) During night operation, a warning light dimming relay incorporated in the lighting system automatically dims five warning lights; generator failure, inverter failure, 20-minute fuel, fuel overflow, and transmission low oil pressure. All lights operate from a 28-volt dc power distribution system.

12–43. Troubleshooting. For troubleshooting procedures for the lighting provisions, proceed as follows:

Note

In all cases, the dc power to operate lights is available only when battery, primary, and secondary supply circuits are energized. Refer to table 12–1 for operating conditions necessary to energize these circuits.

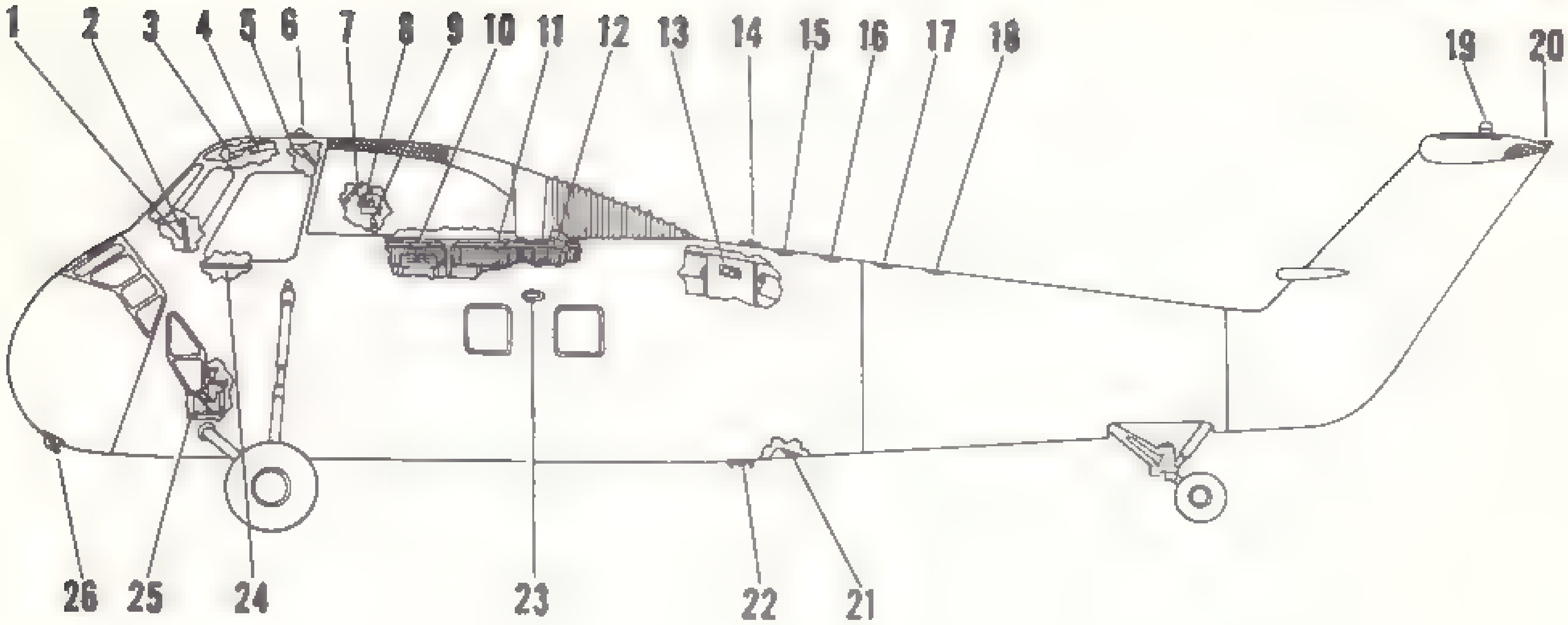
INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Failure of single light or light system to operate	Lamp failure	Replace lamp.
	Circuit breaker out	Reset.
	Switch failure	Replace switch.
	Open circuit	Check continuity (Refer to direct support maintenance unit)
When navigation lights are on FLASH, fuselage lights burn steady and position lights inoperative	Failure of light flasher	Replace light flasher.
Warning lights do not come on when pressed to test	Lamp failure	Replace lamp.
	Open circuit	Check continuity (Refer to direct support maintenance unit)

12–44. Exterior Lights. Exterior lights consist of navigation lights, light flasher, formation lights, landing light, cargo floodlight, and rotating light. Operation of exterior lights is controlled by switches on the overhead switch panel (4, figure 12–1 or 5, figure 12–2). (See figure 12–18.)

Note

Landing light switches are located in the control box installation (3, figure 12–1 or 4, figure 12–2) on the pilot's collective pitch lever.

12–45. Navigation Lights. Navigation lights consist of three position lights (20 and 23, figure 12–18) and three fuselage lights (6, 14, and 22). Position lights are located as follows: A red light on the left side of the fuselage, a green light on the right side of the fuselage, and a white light on the top of the pylon. The fuselage lights are all white and are located as follows: One on top of the cockpit canopy, one aft of the main transmission fairing, and one on bottom of the fuselage. The navigation lights are controlled by an operating switch and a dimming switch jointly marked EXTERIOR LIGHTS POSITION on overhead switch panel of overhead control panel. (See figures 12–12, 12–13, or 12–14.) Power to operate the navigation lights is taken from the 28-volt dc secondary supply through the EXTERIOR LIGHTS circuit breaker, marked NAV, on the fuse and circuit breaker panel of the overhead control panel. The power circuit connects to the navigation lights through the operating switch which has three positions, marked FLASH, OFF, and STEADY. When operating switch is on STEADY,



1. Panel Lights (Main Switch Panel)
2. Instrument Lights (Instrument Panel)
3. Spotlight (Instrument Panel Floodlight)
4. Panel Lights (Overhead Switch Panel)
5. Dome Light (Cockpit)
6. Fuselage Light (Top Forward — White)
7. Inspection Light (Primary Hydraulic System Reservoir)
8. Inspection Light (Auxiliary Hydraulic System Reservoir) (Helicopters Serial No. 56-4313 and Subsequent and Model CH-34C)
9. Inspection Light (Transmission Oil Level)
10. Dome Light (Cabin — Forward)
11. Dome Light (Cabin — Aft)
12. Spotlight (Cabin)
13. Dome Light (Electronics Compartment)
14. Fuselage Light (Top Aft — White)
15. Formation Light (Green)
16. Formation Light (White)
17. Formation Light (White)
18. Formation Light (Red)
19. Rotating Light
20. Position Light (Tail-White)
21. Cargo Floodlight
22. Fuselage Light (Bottom — White)
23. Position Lights (Red — LH Side) (Green — RH Side)
24. Panel Lights (Control Console)
25. Inspection Light (Auxiliary Hydraulic System Reservoir) (Helicopters Serial No. Prior to 56-4313)
26. Landing Light (Bottom — Forward)

Figure 12—18. Interior and exterior lights location diagram

power is connected to the dimming switch which has two marked positions, DIM and BRT. With the dimming switch on BRT, power is connected directly to the navigation lights through two parallel circuits, one for the position lights and one for the fuselage lights. (See figure 12—19.) With dimming switch on DIM, a dimming resistor (1 and 5, figure 12—15, 12—16, or 12—17) is cut into each of the two parallel circuits. The dimming resistors are located in the electrical relay and resistor box (7, figure 12—1 or 8, figure 12—2) mounted behind the cockpit dome light panel. When the operating switch is on FLASH, power is connected to a light flasher (17, figure 12—1 or 13, figure 12—2). Two output circuits from the light flasher connect back through the FLASH position of the operating switch to the dimming switch, from which one circuit connects to the position lights and one to the fuselage lights. The light flasher circuit flashes the position and fuselage lights alternately with dimming switch in either BRT or DIM position.

a. Operational check. To check the navigation lights, place EXTERIOR LIGHT position switches on STEADY and BRT, respectively, and check that all navigation lights are burning brightly. Check navigation lights similarly on STEADY and DIM, FLASH and BRT, and FLASH and DIM.

b. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle. Pull out EXTERIOR LIGHTS circuit breaker, marked NAV, located on fuse and circuit breaker panel.

(2) Remove position lights (23, figure 12—18) as follows:

(a) Remove screw securing lens. Remove lens, lamp, and gasket from lamp socket base.

(b) Pull lamp socket base from its mounting and disconnect electrical plug. Remove lamp socket base.

(3) Remove fuselage light (6, 14, or 22) and position light (20) as follows:

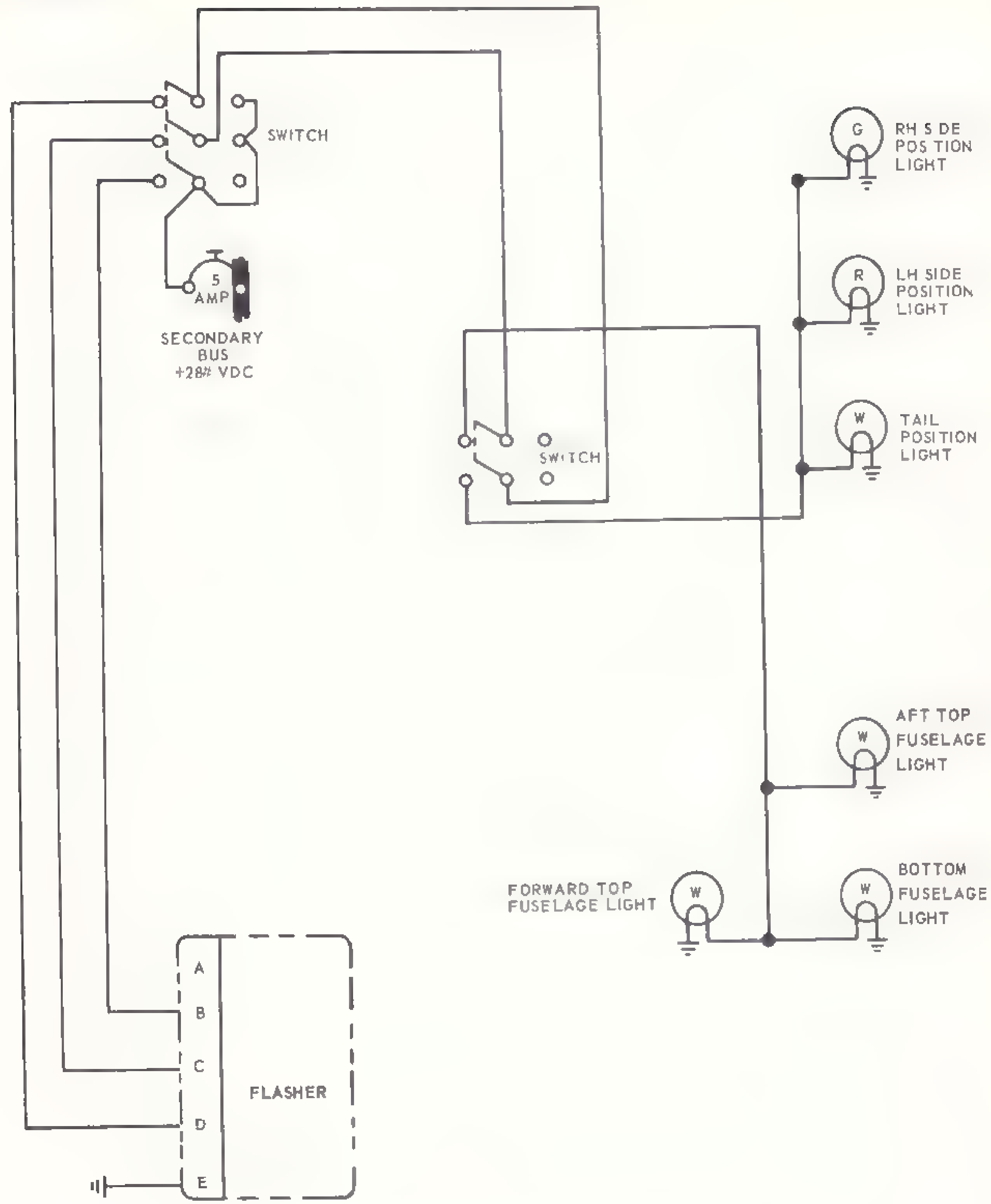


Figure 12—19. Navigation lights (typical simplified circuit)

(a) Remove screws securing fuselage light (or position light). Pull light from its mounting.

(b) Remove lens retainer, lens, gasket, and lamp from lamp socket base.

(c) Disconnect electrical plug from lamp socket base.

c. Inspection. Inspect navigation light for corrosion, distortions, damaged threads, chipped or broken lens, damaged or burnt out lamp, and damaged socket.

d. Repair or replacement. Repair of navigation lights is accomplished by replacing unserviceable components with like serviceable components.

e. Installation. (1) Install fuselage light (6, 14, or 22, figure 12–18) and position light (20) as follows:

(a) Connect electrical plug to lamp socket base.

(b) Assemble fuselage light (or position light) by installing lamp in lamp socket base and position gasket, lens, and lens retainer on lamp socket base.

(c) Place light on mounting and secure with screws.

(2) Install position light (23) as follows:

(a) Connect electrical plug to lamp socket base.

(b) Position lamp socket base on mounting and secure with crews.

(c) Install gasket and lamp on lamp socket base. Install lens and secure with screw.

(3) Reset EXTERIOR LIGHTS circuit breaker, marked NAV.

(4) Perform operational check as outlined in step *a*.

Note

Connect an external power source to external power receptacle prior to performing operational check.

12–46. Light Flasher. On helicopters serial No. prior to 56-4313, the light flasher (17, figure 12–1) is located on the right shelf of the electronic compartment. On helicopters serial No. 56-4313 and subsequent, the light flasher (13, figure 12–2) is located on the top shelf at the right side of the forward bulkhead in the electronics compartment. The two output circuits flash the position and fuselage lights alternately, each circuit flashing 40 cycles per minute. In the event of failure of the flashing device, the fuselage light circuit will automatically close and the fuselage lights will burn continuously.

a. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle. Pull EXTERIOR LIGHTS circuit breaker, marked NAV, located on the fuse and circuit breaker panel.

(2) Disconnect electrical plug from light flasher (17, figure 12–1 or 13, figure 12–2).

(3) Remove screws, washers, and nuts securing light flasher to shelf. Remove light flasher.

b. Inspection. Inspect light flasher for corrosion, indication of overheating, arcing, or burning, and loose or damaged components.

c. Installation. (1) Position light flasher (17, figure 12–1 or 13, figure 12–2) on shelf and secure with screws, washers, and nuts.

(2) Connect electrical plug to light flasher. Lockwire electrical plug.

(3) Reset EXTERIOR LIGHTS circuit breaker, marked NAV, and connect battery leads to battery terminals.

(4) Perform operational check as outlined in paragraph 12–45*a*.

12–47. Formation Lights. Four formation lights (15, 16, 17, and 18, figure 12–18) are installed in a fore-and-aft line along top of the fuselage from forward to aft they are green, white, white, and red. The formation lights are operated by the switch marked FORM located on the overhead switch panel of the overhead control panel (figures 12–12, 12–13, or 12–14). The switch has three positions; DIM, OFF, and BRT. In the DIM position, a dimming resistor is cut into the power circuit to the formation lights. The dimming resistor (4, figure 12–15, 12–16, or 12–17) is mounted in the electrical relay and resistor box (7, figure 12–1 or 8, figure 12–2) behind the cockpit dome light panel, power for the formation lights (figure 12–20) is taken from the 28-volt dc secondary supply circuit through EXTERIOR LIGHTS circuit breaker, marked FORM or FORM & ROT on fuse and circuit breaker panel of overhead control panel.

a. Operational Check. To check the formation lights, place FORM switch on BRT and check that all formation lights are burning brightly. Check formation lights similarly with FORM switch on DIM.

Note

Connect an external power source to external power receptacle prior to performing operational check.

b. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle. Pull EXTERIOR LIGHTS circuit breaker, marked FORM or FORM & ROT, located on fuse and circuit breaker panel.

(2) Remove screws securing formation light (15, 16, 17 or 18, figure 12–18) to mounting flange. Lift

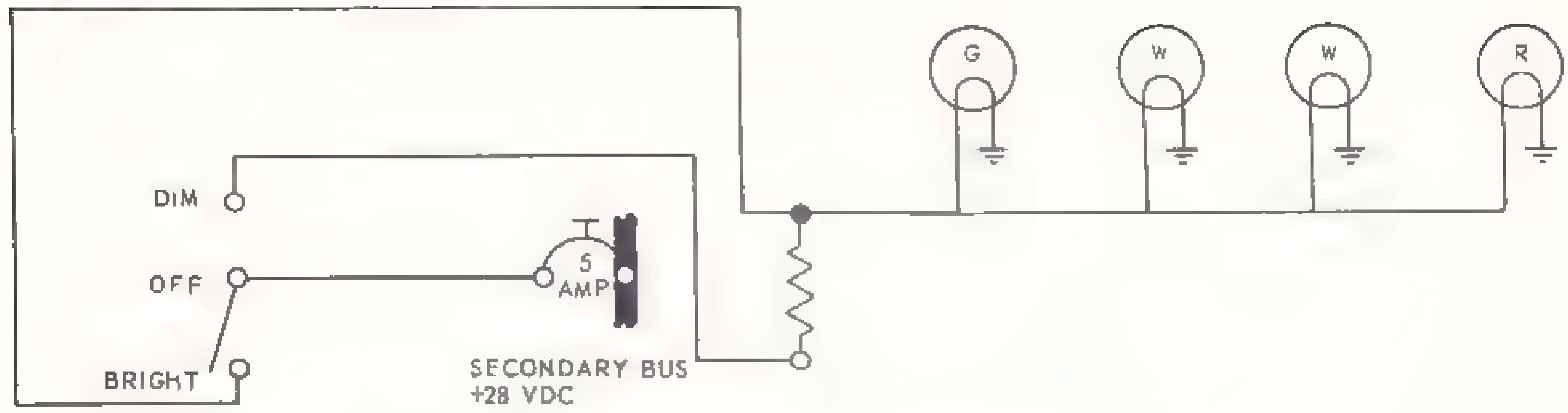


Figure 12–20. Formation lights (typical simplified circuit)

formation light from mounting flange and disconnect electrical wiring.

(3) Separate lens and gasket from lamp socket base and remove lamp.

c. Inspection. Inspection formation light for corrosion, cracks, distortions, damaged threads, chipped or broken lens, damaged socket, damage or burnt out lamp, and clogged drain hole.

d. Repair or replacement. Repair of formation light consists of replacing unserviceable components with like serviceable components.

e. Installation. (1) Install lamp in lamp socket base and position gasket and lens in place on lamp socket base.

(2) Connect electrical wiring to formation light.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(3) Place formation light on its mounting flange and secure with screws.

(4) Reset EXTERIOR LIGHTS circuit breaker, marked FORM or FORM & ROT.

(5) Perform operational check as outlined in paragraph *a*.

12–48. Landing Light. The landing light (26, figure 12–18), located in the lower section of the left nose door, may be extended, retracted, and rotated. The landing light is controlled by two switches on the control box installation (3, figure 12–1 or 4, figure 12–2) attached to the pilots collective pitch control. One, a master light switch, is marked MASTER – OFF – RETRACT; the second, is marked EXTEND – RETRACT – L – R. The landing light can be turned off while extended by placing the master light switch on OFF and turned off and retracted by placing the master light switch on RETRACT. Power for the landing light is taken from the secondary supply circuit through two LANDING LIGHT circuit breakers, marked LAMP and MOTOR, located on fuse and circuit breaker panel. (See figures 12–21 and 12–22.)

a. Operational check. To check landing light, operate landing light by means of MASTER–OFF–RETRACT and EXTEND – RETRACT – L – R switches, located on control box installation (3, figure 12–1 or 4, figure 12–2). Check that light operates and that light can be fully extended, rotated, and retracted.

Note

Connect an external power source to external power receptacle prior to performing operational check.

b. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external

Figure 12–21. Landing light

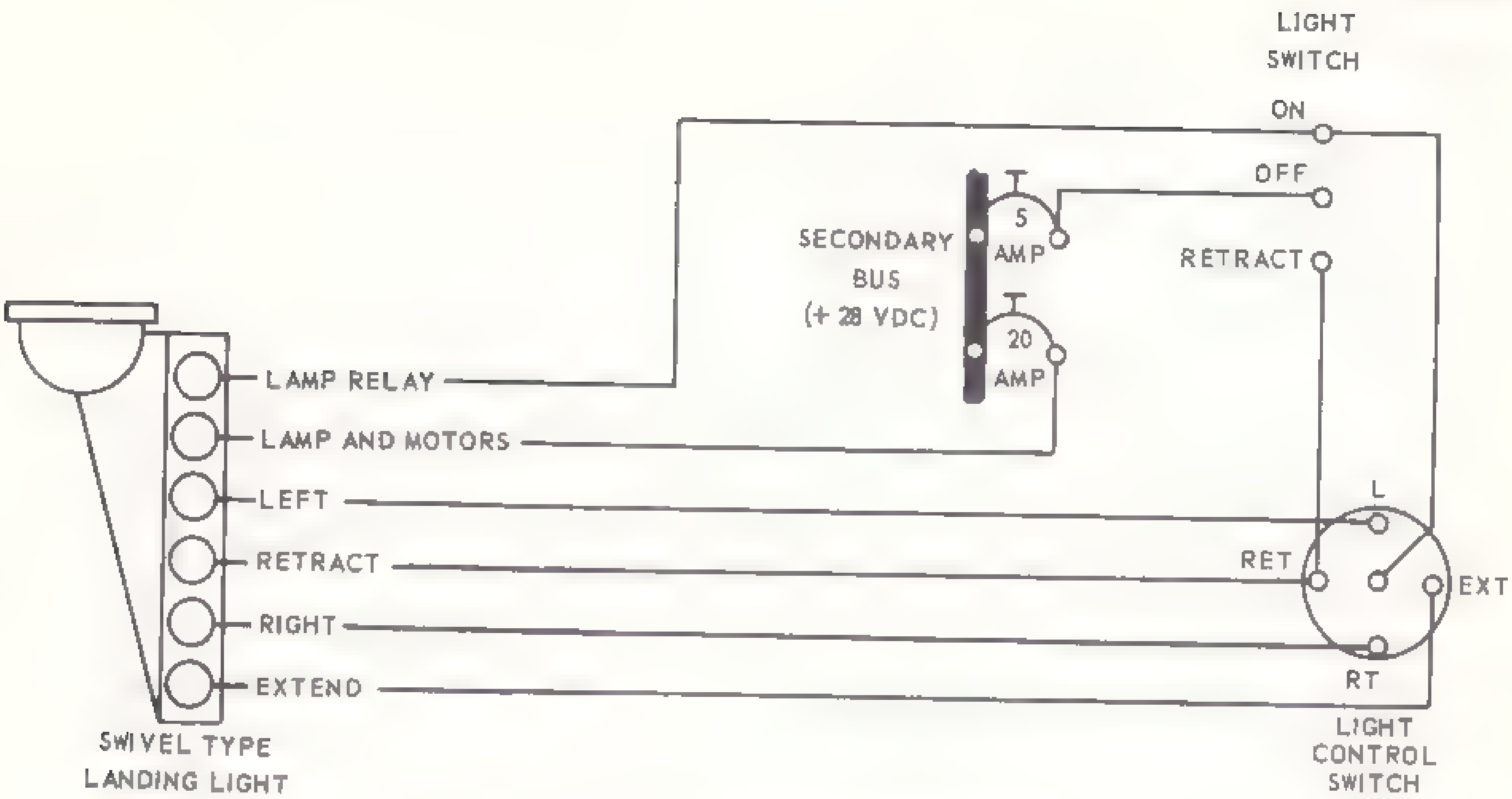


Figure 12–22. Landing light (typical simplified circuit)

power receptacle. Pull out LANDING LIGHT circuit breakers, marked LAMP and MOTOR, located on fuse and circuit breaker panel.

(2) Open left nose door. Remove screws securing landing light (26, figure 12–18) to nose door.

(3) Lift landing light from its mounting. Remove screws securing protective plate over terminals. Remove protective plate.

(4) Disconnect electrical wires from landing light. Remove landing light.

(5) Remove lamp from landing light as follows:

Note

Lamp may be removed with landing light removed or installed.

(a) Remove screws securing lamp holding ring. Remove lamp holding ring.

(b) Lift lamp out of well and disconnect electrical wires. Remove lamp.

c. Inspection. Inspect landing light for corrosion, cracks, loose or damaged components, burnt out or damaged lamp, indication of overheating, and worn or damaged electrical wires.

d. Repair or replacement. Repair of landing light consists of replacing unserviceable lamp with a serviceable lamp.

e. Installation. (1) Install lamp in landing light as follows:

Note

Lamp may be installed with landing light installed or removed.

(a) Connect electrical wires to lamp.

(b) Position lamp in well of landing light (26, figure 12–18).

(c) Position lamp holding ring over lamp and secure with screws.

(2) Vaporproof landing light as follows:

Caution

In order to reduce possibility of an explosion resulting from arcing contacts in presence of explosive vapors, all retractable landing lights mounted in areas adjacent to fuel and anti-icing alcohol tanks, or their respective lines, will be vaporproofed in accordance with steps *(a)* through *(d)* prior to installation and each time sealed surface is disturbed or broken.

(a) Mask components of landing light that are not to be sprayed, or brushed, including electrical connections.

(b) Apply sealing compound (item 48, table 1–8) into all holes, openings, and crevices around noise filter, motor, and gear housing. Also apply sealing compound where gear housing and canopy join.

(c) Brush or spray entire motor, gear housing, and area where gear housing and canopy join with two coats of cellulose adhesive (item 51, table 1–8).

Caution

Cellulose adhesive should be applied in well ventilated area or spray booths. Respiratory protection is necessary when ventilation is inadequate to remove vapors from work space.

(d) Allow cellulose adhesive to dry thoroughly (approximately 4 hours) before removing masking. When removing masking, use a dull knife to cut sealant along edges to prevent cellulose adhesive from being peeled off with masking.

(3) Connect electrical wires to proper terminals on landing light (26, figure 12–18).

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(4) Position protective cover over terminals and secure with screws.

(5) Position landing light in left nose door and secure with screws.

(6) Reset LANDING LIGHT circuit breakers marked LAMP and MOTOR, located on fuse and circuit breaker panel.

(7) Perform operational check as outlined in paragraph *a*.

12–49. Cargo Floodlight. The cargo floodlight (21, figure 12–18) is mounted on the fuselage below and aft of the cargo door and provides illumination for pickup and release of cargo during night operations. The cargo floodlight is operated by either one or two switches, one for the pilot and one for the crew. The pilot's switch, marked CARGO FLD LT, is located on the overhead switch panel of the overhead control panel (figure 12–12, 12–13, or 12–14) and has three positions, marked CREW, OFF, and PILOT. The crew switch, marked CARGO FLOOD LIGHT, is located on the right side of the cabin above the cargo door and has two positions, marked ON and OFF. The crew switch is on the same panel with the cabin dome light switch. (See figure 12–23.) The crew switch is inoperative unless the pilot's switch is in the CREW position. (See figure 12–24.) The pilot may operate the cargo floodlight by placing pilot's switch in PILOT position. Power for the light is supplied from the secondary supply circuit.

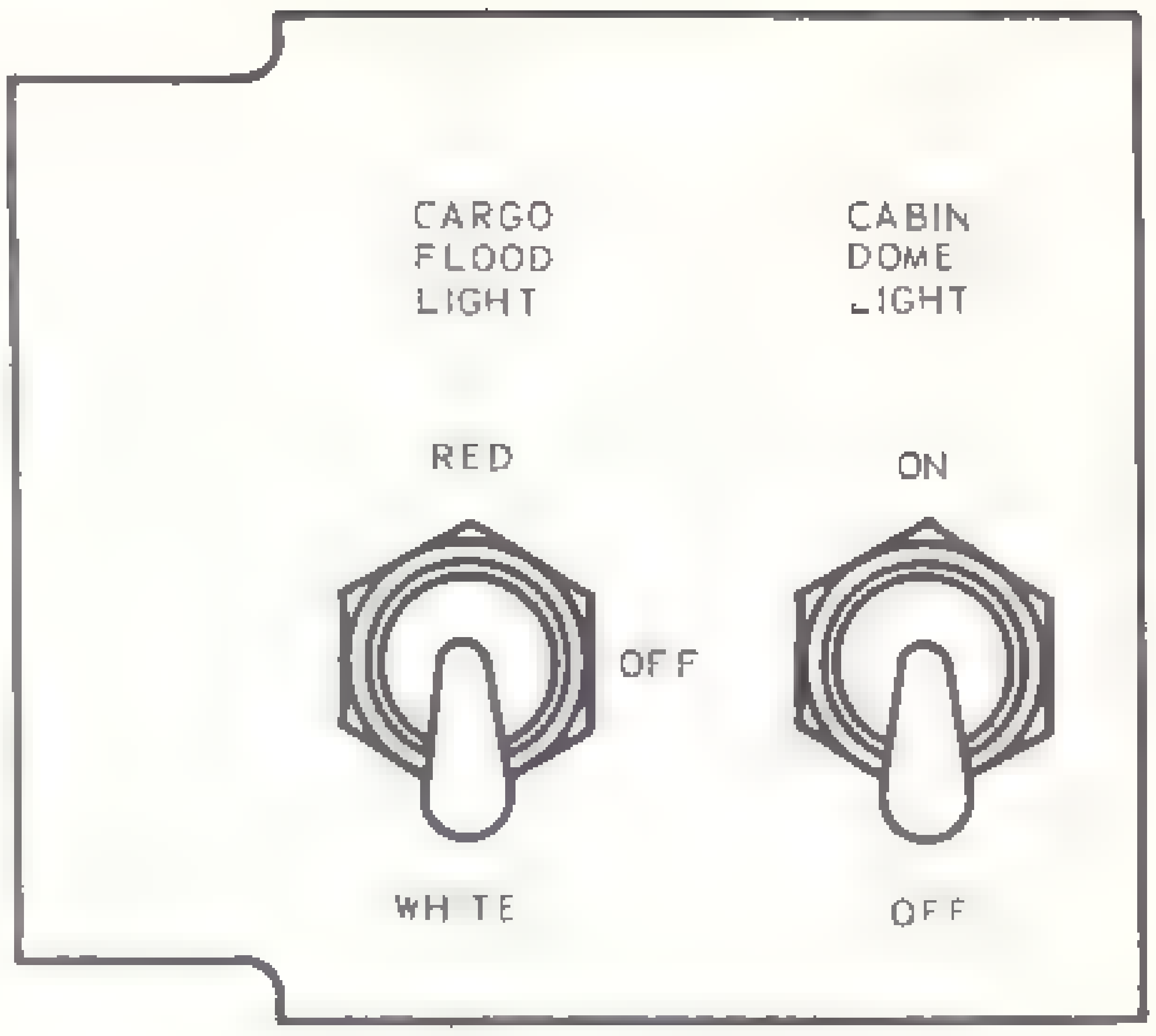


Figure 12–23. Cabin dome lights and cargo floodlight switches

a. Operational check. Check operation of cargo floodlight with pilot switch, marked CARGO FLDLT, in PILOT position and also with pilot switch in CREW position and crew switch, marked CARGO FLOOD LIGHT, in ON position. Cargo flood light should illuminate.

Note

Connect an external power source to external power receptacle prior to performing operational check.

b. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle. Pull out CARGO FLD LT circuit breaker, located on fuse and circuit breaker panel.

(2) Remove screws and washers securing floodlight retainer, outer gasket, cargo floodlight (21, figure 12–18), and inner gasket to mounting.

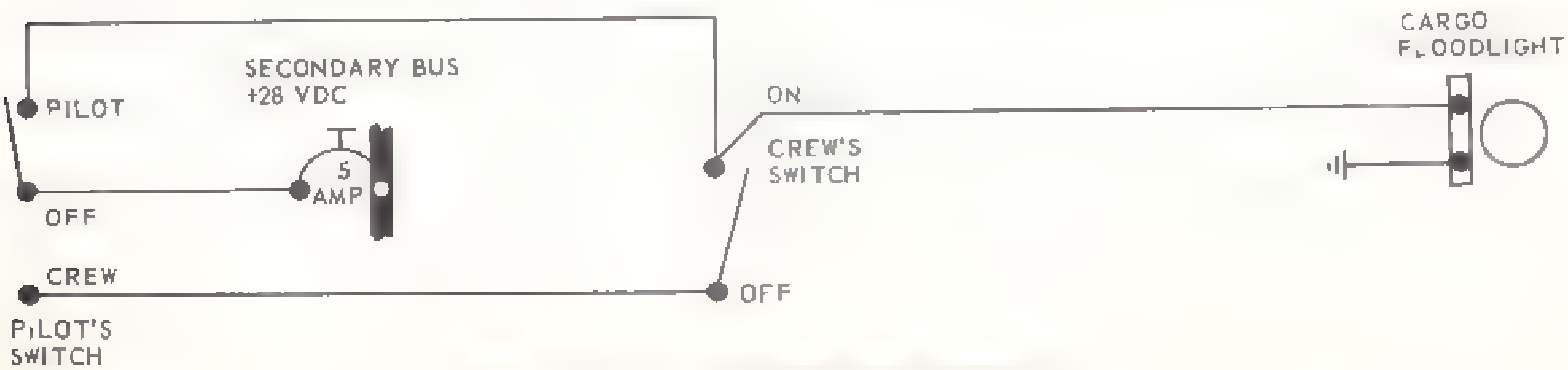


Figure 12–24. Cargo floodlight (typical simplified circuit)

(3) Remove floodlight retainer and outer gasket. Lift cargo floodlight and inner gasket from mounting. Remove inner gasket.

(4) Disconnect electrical wires from cargo floodlight. Remove cargo floodlight.

c. Inspection. Inspect cargo floodlight for chipping, cracks or breaks, lens discoloration, and damaged terminals.

d. Repair or replacement. Repair of cargo floodlight consists of replacing unserviceable cargo floodlight with serviceable cargo floodlight.

e. Installation. (1) Connect electrical wires to cargo floodlight (21, figure 12–18).

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(2) Position a new inner gasket on locating lug side of cargo floodlight. Align inner gasket with locating lug.

(3) Place cargo floodlight and inner gasket on its mount with locating lug properly aligned.

(4) Install outer gasket (new) and floodlight retainer over cargo floodlight and secure with screws and washers.

Note

Insure the outer gasket and floodlight retainer is properly aligned with holding ledge of cargo floodlight.

(5) Reset CARGO FLD LT circuit breaker, located on fuse and circuit breaker panel.

(6) Perform operational check as outlined in paragraph *a*.

12–50. Rotating Light (Helicopter Serial No. 54-3007 and Subsequent. A red rotating light (19, figure 12–18) is installed on the fairing on top of the pylon. The rotating light consists of an electric motor, a dome, dome clamp, and gasket. The rotating light is controlled by a switch, marked ROT LT–ON, located on the overhead switch panel of the overhead control panel (figure 12–12, 12–13, or 12–14). Power for the rotating light is supplied from the secondary supply circuit. (See figure 12–25.)

a. Operational check. Check operation of rotating light with ROT LT–ON switch in ON position. Check that rotating light rotates and illuminates.

Note

Connect an external power source to external power receptacle prior to performing operational check.

b. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle. Pull out EXTERIOR LIGHTS circuit breaker, marked FORM & ROT, located on fuse and circuit breaker panel.

(2) Remove screws and washers securing rotating light (19, figure 12–18) to its mounting.

(3) Lift rotating light from mounting and disconnect electrical plug. Remove rotating light.

(4) Remove lamp from rotating light as follows:

Note

Lamp may be removed with rotating light removed or installed.

(a) Remove screw securing dome clamp. Remove dome clamp, dome, and gasket.

(b) Remove lamp from its socket.

c. Inspection. Inspect rotating light for corrosion, chipped, cracked, or broken dome, burnt out or damaged lamp, damaged electrical receptacle, and indications of overheating.

d. Repair or replacement. Repair of rotating light consists of replacing unserviceable components with like serviceable components.

e. Installation. (1) Install lamp in rotating light (19, figure 12–18) as follows:

Note

Lamp may be installed with rotating light installed or removed.

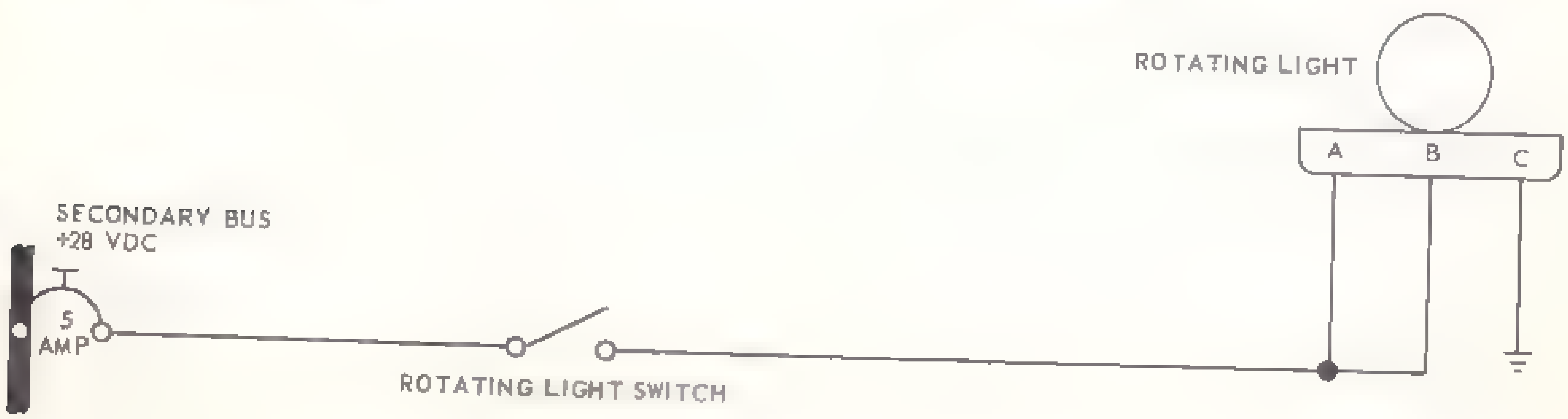


Figure 12–25. Rotating light (typical simplified circuit)

(a) Install lamp in socket.

(b) Install a new gasket, dome, and dome retainer, on electric motor and secure dome retainer with screw. Lockwire screw.

(2) Connect electrical plug to rotating light. Position rotating light on mounting and secure with screws and washers.

(3) Reset EXTERIOR LIGHT circuit breaker, marked FORM & ROT, located on fuse and circuit breaker panel.

(4) Perform operational check as outlined in paragraph *a*.

12–51. Interior Lights. The interior lights consist of the dome lights, spotlights (trouble lights), passenger reading lights, panel lights, instrument lights, and inspection lights.

12–52. Dome Lights. Dome lights (5, 10, 11, and 13, figure 12–18) are provided for general interior lighting and are located as follows: One in the cockpit, two in the cabin, and one in the electronics compartment. The dome lights contain both a white and red lamp and are controlled by switches, marked RED – OFF – WHITE. The cockpit dome light switch, marked DOME LT, is located on the cockpit dome light panel (6, figure 12–1 or 7, figure 12–2) adjacent to the cockpit dome light. The cabin dome lights switch, marked CABIN DOME LIGHTS, is located inside cabin above cargo door adjacent to the CARGO FLOOD LIGHT switch (figure 12–23). The electronics compartment dome light switch is located on the dome light support, and spare lamps (red and white) are provided in clip holders on the electronics compartment dome light panel (figure 12–26). On helicopters serial No. prior to 56-4313, the cockpit dome light (5, figure 12–18) operates from the battery supply circuit through CKPT DOME LTS circuit breaker on battery bus circuit breaker box (13, figure 12–1) in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the cockpit dome light operates from battery supply circuit through the CKPT DOME LTS circuit breaker on the fuse and circuit breaker panel (5, figure 12–7) located in the battery box. The cabin dome lights (10 and 11, figure 12–18) and electronics compartment dome light (13) operate from the secondary supply circuit through CABIN DOME LTS circuit breaker located on the fuse and circuit breaker panel of the overhead control panel (figure 12–12, 12–13, or 12–14).

a. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle.

(2) Pull out CABIN DOME LTS circuit breaker located on fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2). Pull out CKPT DOME LTS circuit breaker on battery bus circuit breaker box (13, figure 12–1) or fuse and circuit breaker panel (5, figure 12–7).

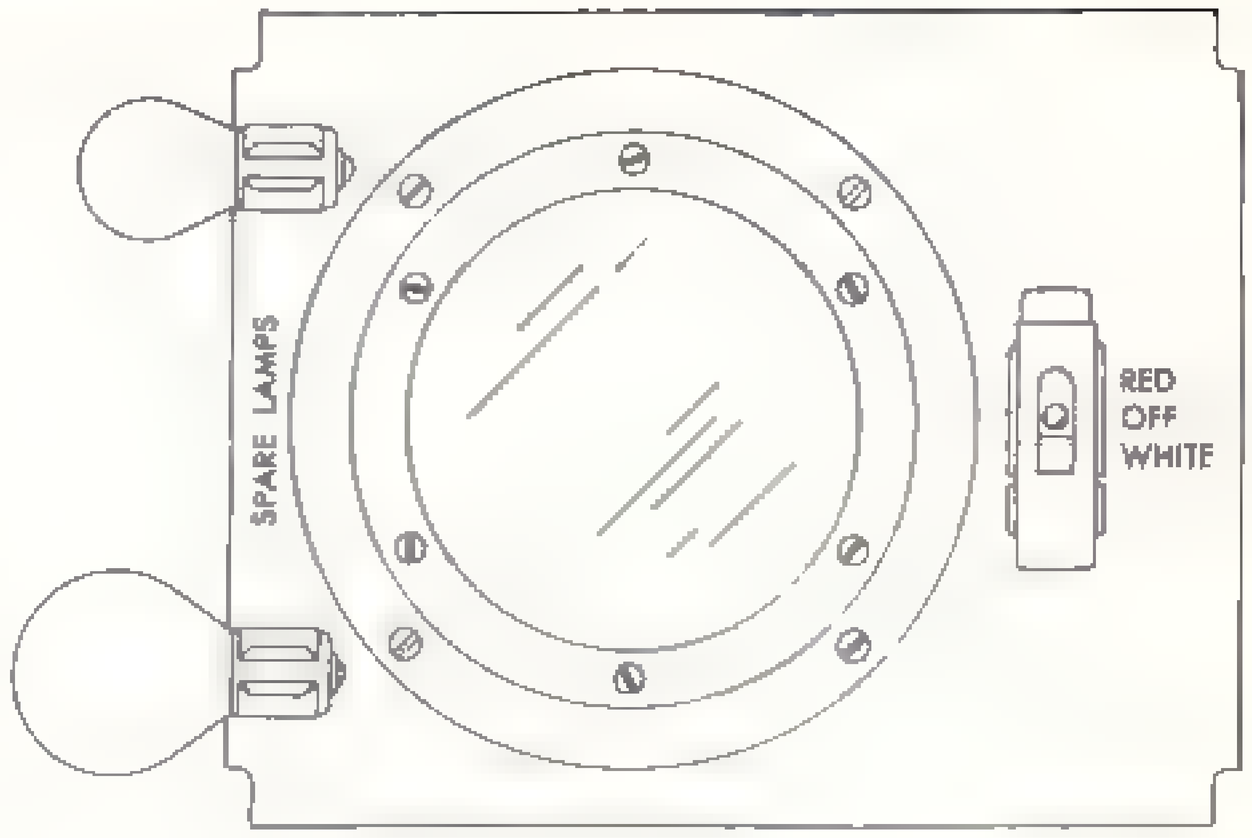


Figure 12–26. Electronics compartment dome light

(3) Remove screws securing dome light (5, 10, 11, or 13, figure 12–18) to its mounting.

(4) Lift dome light from mounting and disconnect electrical wires. Remove dome light.

(5) Remove lamps (red and white) from sockets as follows:

Note

Lamps may be removed with dome light removed or installed.

(a) Remove screws securing lens retainer, lens, and gasket. Remove lens retainer, lens, and gasket.

(b) Remove lamps from sockets.

b. Inspection. Inspect dome light for corrosion, cracks, distortions, chipped, cracked, or broken lens, burnt out or damaged lamps, damaged sockets, and damaged electrical wires.

c. Repair or replacement. Repair of the dome light consists of replacing unserviceable components with like serviceable components.

d. Installation. (1) Install lamps (red and white) as follows:

Note

Lamp may be installed with dome light installed or removed.

(2) Connect electrical wires to dome light (5, 10, 11, or 13, figure 12–18).

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(3) Position dome light on mounting and secure with screws.

(4) Reset CABIN DOME LTS and CKPT DOME LTS circuit breakers.

12–53. Spotlight (Trouble Light). A spotlight (3, figure 12–18), which also serves as an emergency instrument floodlight, is located on the forward end of the overhead switch panel (4, figure 12–1 or 5, figure 12–2) and is controlled by a switch on the spotlight itself. A second spotlight (12, figure 12–18) is located in the aft end of the cabin and is operated in a like manner. On helicopters serial No. prior to 56-4313, the spotlight (3) operates from the battery supply circuit through CKPT DOME LTS circuit breaker on the battery bus circuit breaker box (13, figure 12–1) in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the spotlight operates from the battery supply circuit through CKPT DOME LTS circuit breaker on fuse and circuit breaker panel (5, figure 12–7) located in the battery box. Spotlight (12, figure 12–18) operates from the secondary supply circuit through CABIN DOME LTS circuit breaker located on the fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2).

a. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle.

(2) Pull out CABIN DOME LTS circuit breaker located on fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2). Pull out CKPT DOME LTS circuit breaker on battery bus circuit breaker box (13, figure 12–1) or fuse and circuit breaker panel (5, figure 12–7).

(3) Disconnect electrical wires from spotlight (3 or 12, figure 12–18).

(4) Remove screws, washers, and nuts securing spotlight. Remove spotlight.

b. Inspection. Inspect spotlight for corrosion, damaged socket on electrical wires, burnt out or damaged lamp, chipped, cracked, or broken lens.

c. Repair or replacement. Repair of spotlight consists of replacing unserviceable components with like serviceable components.

d. Installation. (1) Connect electrical wires to spotlight.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(2) Position spotlight on mounting and secure with screws, washers, and nuts.

(3) Reset CABIN DOME LTS and CKPT DOME LTS circuit breakers.

12–54. Passenger Reading Lights (Helicopter serial No. 56-4315). Nine passenger reading lights are provided when the passenger accommodations are installed. The passenger reading lights are located in the cabin along the upper wall assembly above the passenger seats. Each passenger reading light is controlled individually by a self-contained switch. All nine passenger reading lights are controlled collectively by the PASS READ LTS – OFF switch on the overhead switch panel (4, figure 12–1 or 5, figure 12–2) in the cockpit. Power is supplied from primary bus through PASS. READ. LTS. circuit breaker on fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2).

a. Removal. (1) Place BATT switch in OFF position and disconnect electrical power source from external power receptacle. Pull out PASS. READ. LTS. circuit breaker located on fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2).

(2) Remove screws securing passenger reading light.

(3) Lift passenger reading light from mount and disconnect electrical wires. Remove passenger reading light.

b. Inspection. Inspect passenger reading light for corrosion, burnt out or damaged lamp, damaged electrical wires, and chipped, cracked, or broken lens.

c. Repair or replacement. Repair of passenger reading light consists of replacing unserviceable components with like serviceable components.

d. Installation. (1) Connect electrical wires to passenger reading lights.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(2) Position passenger reading light on mounting and secure with screws.

(3) Reset PASS. READ. LTS circuit breaker.

12–55. Panel Lights. Shielded panel lights (1, 4, and 24, figure 12–18), controlled by a combination power switch and dimming rheostat, illuminate the main switch panel (2, figure 12–1 or 3, figure 12–2), overhead switch panel (4, figure 12–1 or 5, figure 12–2), and control console (24, figure 12–1 or 17, figure 12–2). The power switch and rheostat are controlled by the knob, marked CONSOLE & PANEL LTS – OFF – BRT, on the overhead switch panel. The panel lights operate from the primary supply circuit through the INTERIOR LTS circuit breaker on the overhead fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2), marked SW PANEL – CONSOLE.

a. Removal. (1) Place BATT switch in OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Gain access to nuts securing panel lights (1, 4, or 24, figure 12–18) as follows:

(a) If panel lights (1) are to be removed, loosen fasteners securing main switch panel and pull main switch panel from instrument panel.

(b) If panel lights (4) are to be removed, loosen fasteners securing overhead switch panel and hinge down overhead switch panel.

(c) If panel lights (24) are to be removed, loosen fasteners securing applicable radio control and pull radio control panel from control console.

(3) Disconnect electrical wires from each panel light.

(4) Remove nut and washer securing panel light. Remove panel light from front of panel.

(5) Remove lamp from each panel light by removing lamp holder and filter, and lamp from panel light socket.

Note

Lamps may be removed with panel lights removed or installed.

b. Inspection. Inspect panel light for corrosion, damaged threads, damaged terminal, burnt out or damaged lamp, and damaged lamp holder and filter.

c. Repair or replacement. Repair of panel light consists of replacing unserviceable components with like serviceable components.

d. Installation. (1) Install lamp in each panel light by inserting lamp in panel light socket and securing with lamp holder and filter.

Note

Lamp may be installed with panel light removed or installed.

(2) Position panel light in panel and secure with nut and washer.

(3) Connect electrical wire to panel light.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(4) Position main switch panel, overhead switch panel, or radio control panel in place, as applicable, and secure with fasteners.

(5) Connect battery.

12–56. Instrument Lights. Shielded instrument lights (2, figure 12–18) are provided for all instruments. The flight and noninstrument lights are controlled separately by combination power switches and dimming rheostats, marked NON FLT INST LTS – OFF – BRT and FLT INST LTS – OFF – BRT on the overhead switch panel (4, figure 12–1 or 5, figure 12–2). The instruments lights operate from the primary supply circuit through the INTERIOR LIGHTS NON FLT INST and FLT INST circuit breakers on the overhead fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2).

a. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle. Pull out INTERIOR LIGHTS NON FLT INST and FLT INST circuit breakers on fuse and circuit breaker panel.

(2) Hinge down each light shield cover and remove lamps.

(3) Remove screws securing light shield and instrument to instrument panel.

(4) Pull light shield and instrument out of instrument panel. Disconnect electrical wires and remove light shield.

b. Inspection. Inspect instrument light for corrosion, distortions, cracks, damaged sockets, burnt out or damaged lamps, and damaged electrical wires.

c. Repair or replacement. Repair of instrument light consists of replacing unserviceable components with like serviceable components.

d. Installation. (1) Position each light shield on instrument and connect electrical wires and tubing, as required.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(2) Position instrument and light shield on instrument panel and secure with screws.

(3) Install lamps and hinge up light shield cover.

(4) Reset INTERIOR LIGHTS NON FLT INST and FLT INST circuit breakers.

12–57. Inspection Lights. Three inspection lights (7, 8 or 25, and 9, figure 12–18) are provided: one for the primary hydraulic reservoir, one for the auxiliary hydraulic reservoir, and one for the transmission oil level. On helicopters serial No. prior to 56-4313, the inspection light switch for the auxiliary hydraulic system reservoir is in the clutch compartment, mounted adjacent to the inspection light; on helicopters serial No. 56-4313 and subsequent, the inspection light switch is located on the right side of the canted bulkhead on the transmission deck. The inspection light switch mounted on the left side of the canted bulkhead on the transmission deck operates the inspection lights for the primary hydraulic reservoir and transmis-

sion oil level. On helicopters serial No. 56-4313 and subsequent, an additional inspection light switch is mounted over the observer's right shoulder on the canted bulkhead in the cockpit; this inspection light switch also operates the primary hydraulic system reservoir inspection light and transmission oil level inspection light. The inspection lights receive power from the battery supply circuit through CKPT DOME LTS circuit breaker on battery bus circuit breaker box (13, figure 12–1) in the electronics compartment on helicopters serial No. prior to 56-4313. On helicopters serial No. 56-4313 and subsequent, the inspection lights receive power from the battery supply circuit through the CKPT DOME LTS circuit breaker, located on the fuse and circuit breaker panel (5, figure 12–7) in the battery box.

a. Removal. (1) Place BATT switch in OFF position and disconnect external power source from external power receptacle. Pull out CKPT DOME LTS circuit breaker located on battery bus circuit breaker box (13, figure 12–1) or fuse and circuit breaker panel (5, figure 12–7).

(2) Remove screws securing inspection light to its mounting.

(3) Lift inspection light from mounting and disconnect electrical wire. Remove inspection light.

(4) Remove lamp from inspection light by pulling hood from light base and remove lamp.

Note

Lamp may be removed with inspection light installed or removed.

b. Inspection. Inspect inspection light for corrosion, cracked or distorted hood, damaged threads, burnt out or damaged lamp, and damaged light base.

c. Repair or replacement. Repair of inspection light consists of replacing unserviceable components with like serviceable components.

d. Installation. (1) Install lamp in socket of light base and install hood.

Note

Lamp may be installed with inspection light installed or removed.

(2) Connect electrical wire to inspection light.

(3) Position inspection light on mounting and secure with screws.

(4) Reset CKPT DOME LTS circuit breaker on battery bus and circuit breaker box (13, figure 12–1) or fuse and circuit breaker panel (5, figure 12–7).

12–58. Warning Light Dimming Relay. The warning light dimming relay (2, figure 12–15, 12–16, or 12–17) is located in the electrical relay and resistor box (7, figure 12–1 or 8, figure 12–2) behind the cockpit dome light panel (6, figure 12–1 or 7, figure 12–2). A warning light dimming switch, marked WARN LTS, is located on the main switch panel (2, figure 12–1 or 3, figure 12–2) and has two positions, BRT and DIM. The warning light dimming switch is closed when in the DIM position so that warning light dimming relay is energized whenever the flight instruments lights are turned on. When the warning light dimming relay is energized, a dimming resistor is cut into the power circuit to five warning lights: generator failure, inverter failure, transmission low oil pressure, fuel overflow, and 20-minute fuel. The dimming resistors (1, figure 12–15, 12–16, or 12–17) are mounted in the electrical relay and resistor box. Power for the warning light dimming relay is supplied from the primary supply circuit.

12–59. Removal. a. Place BATT switch in OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. Loosen fasteners and hinge down cockpit dome light panel (6, figure 12–1 or 7, figure 12–2) of overhead control panel.

Warning

Short circuits in overhead control panel may cause fires that would damage equipment or injure personnel. Before hinging down cockpit dome light panel, insure that battery and external power source are disconnected.

c. Disconnect electrical wires from warning light dimming relay (2, figure 12–15, 12–16, or 12–17).

d. Remove screws and washers securing warning light dimming relay. Remove warning light dimming relay.

12–60. Inspection. Inspect warning light dimming relay for corrosion, cracks, damaged terminals, and indication of overheating, arcing, or burning.

12–61. Installation. a. Position warning light dimming relay (2, figure 12–15, 12–16, or 12–17) in electrical relay and resistor box (7, figure 12–1 or 8, figure 12–2) and secure with screws and washers.

b. Connect electrical wires to proper terminals on warning light dimming relay.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

c. Position cockpit dome light panel (6, figure 12–1 or 7, figure 12–2) of overhead control panel in place and secure with fasteners.

d. Connect battery.

12–62. Magnetic Brake Trim System, Forward and Aft (Force Gradient Installation).

The system includes two electrically-operated magnetic brakes, control switches, and two spring cylinder assemblies. One magnetic brake and one spring cylinder are installed for lateral control and one magnetic brake and one spring cylinder are installed for fore-and-aft control. Both magnetic brakes are mounted in the left side of the clutch compartment where they are connected to the cyclic control system by the spring cylinders. The switch marked STICK TRIM – ON, located on the overhead switch panel, provides master control of the system. When the master switch is placed in the ON position, the brake solenoids are deenergized and the stick trim system is in operation. When the master switch is placed in the STICK TRIM position, the brake solenoids are inoperative and do not hold the arms, thus leaving the stick trim system inoperative. The cyclic stick may be moved from the fixed position, but the resistance created by the spring cylinders increases progressively. When pressure on the stick is released, the action of the spring cylinders brings the stick back to the original position. The stick trim system may be disengaged by pushing in the STICK TRIM switch on either cyclic control stick grip. The STICK TRIM switch energizes the circuit to release the magnetic brake. When the switch is released, the magnetic brakes again function to position the arms and the trim action of the system is moved to operate around the new position. The dc power for the system is supplied from the secondary bus through a circuit breaker on the overhead circuit breaker and fuse panel.

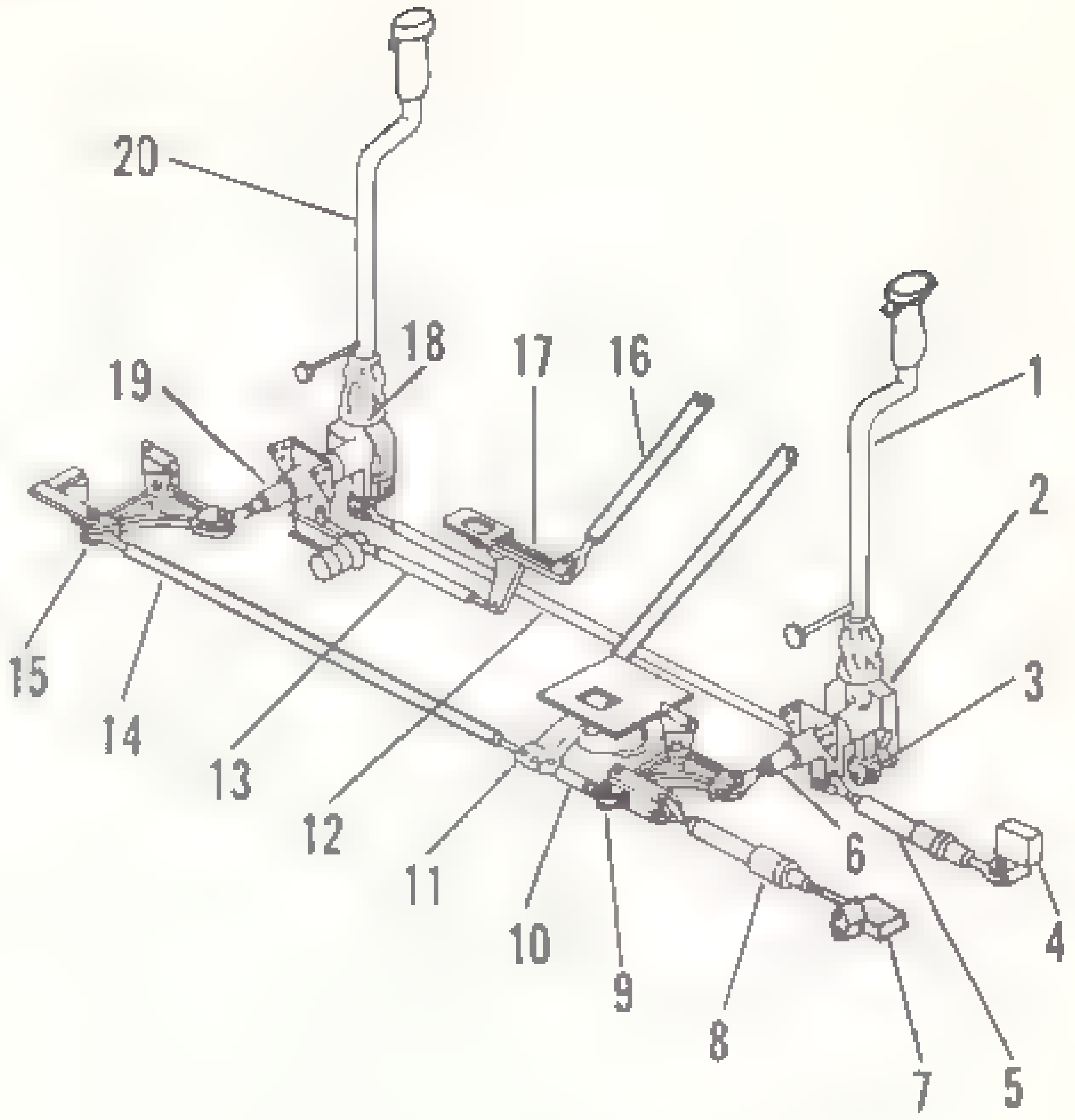
Caution

It is permissible to move cyclic control stick from one extreme position to another extreme position with stick trim system operating, but STICK TRIM switch must not be pressed under these conditions.

12–63. Operational Check. a. Remove clutch access door. Center cyclic control stick fore and aft and laterally by installing a 1/4 x 10-inch rigging pin through both yokes (3, figure 12–27) and a 3/16 x 6-inch rigging pin through bell cranks (9 and 15).

b. Disconnect lateral stick trim cylinder (5) from arm on lateral magnetic brake unit (4). Disconnect fore-and-aft stick trim cylinder (8) from arm on fore-and-aft magnetic brake unit (7).

c. Connect a source of external power and place battery-generator switch in BATT ONLY position. Check that STICK TRIM switch on overhead switch panel is in STICK TRIM position. Center arms of magnetic brake units in midpoint of travel by pressing STICK TRIM switch on either cyclic control stick.



1. Copilot's Cyclic Control Stick
2. Socket and Yoke Assembly Universal
3. Yoke
4. Lateral Magnetic Brake Unit
5. Lateral Stick Trim Cylinder
6. Rod
7. Fore-and-Aft Magnetic Brake Unit
8. Fore-and-Aft Stick Trim Cylinder
9. Bell Crank
10. Rod
11. Bell Crank Assembly
12. Rod
13. Rod
14. Rod
15. Bell Crank
16. Rod
17. Bell Crank
18. Support and Yoke Assembly
19. Rod
20. Cyclic Control Stick and Socket

Figure 12–27. Magnetic brake trim system

Note

When STICK TRIM switch on either cyclic control stick is pressed, arm on fore-and-aft brake unit must rotate 45 degrees in either direction from vertical. Lateral brake unit arm must rotate 45 degrees in either direction from neutral forward position. If necessary, position arm on shaft of magnetic brake unit to obtain this movement.

d. Bolt fore-and-aft stick trim cylinder (8) to fore-and-aft magnetic brake unit (7) and bolt lateral stick trim cylinder (5) to lateral magnetic brake unit (4). Remove rigging pins which were installed.

Note

Check cylinders for end play and spring resistance by following instructions in steps *e* through *h*.

e. Hold cyclic stick in neutral position to center magnetic brake arm, place master control switch on overhead control panel in STICK TRIM position, and press STICK TRIM button on circuit breaker panel.

f. Apply external hydraulic pressure to auxiliary servo system at disconnects.

g. Check that pilot's cyclic stick free play in a fore-and-aft or lateral direction does not exceed 1/8 inch when stick is subject to a 1/4-pound load.

h. Connect a scale to grip. The pull required to move stick from its set position should be between 0 pounds and 3/4 pounds in any direction.

Note

Check stick trim system for operation by following instructions in steps *i* and *j*.

i. Move either cyclic control stick to full forward, full aft, full left lateral, and full right lateral positions. Check stick for a force of from 2 to 4-1/2 pounds at each extreme of travel.

j. Press STICK TRIM switch on either cyclic control stick and move stick to full forward, full aft, full left lateral, and full right lateral positions until it hits stops with no resistance from cylinders. Release switch when stick is in each extreme of travel and check that the stick stays in each position. While stick is in each extreme of travel, move stick to opposite extreme of travel without pressing STICK TRIM switch and check for a force of 2 to 7 pounds in this position. Check that stick returns to each position for which it was set.

Caution

Do not press STICK TRIM switch on either cyclic control stick until stick returns to its preset or neutral position.

k. Replace clutch access door.

12–64. Removal (Magnetic Brake). a. Remove attaching hardware from rod ends at lateral magnetic brake unit (4, figure 12–27). Disconnect wiring at plugs on magnetic brake units.

b. Remove hardware attaching the lateral magnetic brake unit (4) to forward side of cabin forward bulkhead and lift magnetic brake from bulkhead.

c. Remove hardware attaching outboard rod end fore-and-aft magnetic brake unit (7).

d. Remove hardware attaching fore-and-aft magnetic brake unit (7) to bracket and remove brake.

12–65. Inspection (Magnetic Brake). Inspect magnetic brake for corrosion, cracks, loose or damaged components, and indications of overheating.

12–66. Installation (Magnetic Brake). a. Install lateral magnetic brake unit (4, figure 12–27) in bracket.

b. Position fore-and-aft magnetic brake unit (7) to allow equal travel in both directions. Bolt cylinder to arm on fore-and-aft magnetic brake unit (7).

c. Install lateral magnetic brake unit (4) at cabin forward bulkhead with bolts.

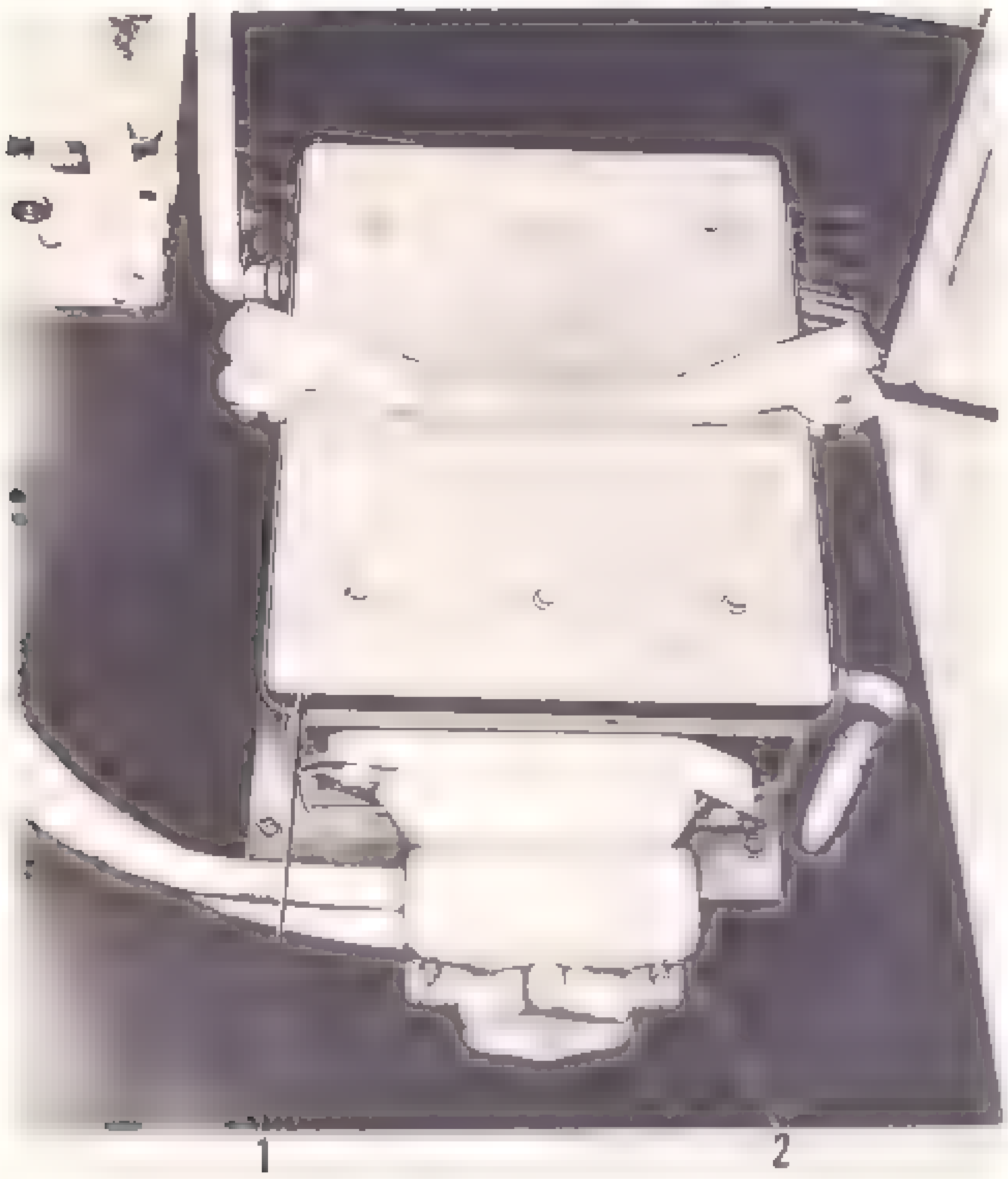
d. Position lateral magnetic brake unit arm to allow equal travel in both directions. Tighten check nut and connect cylinder outboard rod end to brake.

e. Perform operational check as outlined in paragraph 12–63.

Section III Battery

12–67. Description. The battery section consists of a battery, battery sump jar, battery switch, and battery relay.

12–68. Battery. A 24-volt, 36-ampere-hour battery (1, figure 12–28 or 6, figure 12–7) is used in the dc electrical system of the helicopter. Electrical connections to the battery are made through a quick disconnect battery plug (2, figure 12–28 or 8, figure 12–7). The negative terminal of the battery is grounded to the helicopter structure. The positive terminal is connected directly to both the battery relay and the battery supply circuit. On helicopters serial No. prior to 56-4313, the battery (1, figure 12–28) is located in the forward right corner of the electronics compartment. The battery is vented by a plastic tube extending through the right side of the helicopter and incorporates a plastic overflow tube, a battery sump jar containing a pad saturated with a neutralizing agent, and a plastic vent tube leading from battery sump jar down through the bottom of the helicopter. The floor, bulkhead, and skin surfaces in the battery area of the electronics compartment are coated with acid-resistant lacquer. On helicopters serial No. 56-4313 and subsequent, the battery (6, figure 12–7) is located in the battery box in the left side of the clutch compartment. The battery is installed on a sliding shelf, and access



1. Battery
2. Quick Disconnect Battery Plug

Figure 12–28. Battery installation (helicopters serial No. prior to 56-4313)

to the battery is gained by removing the battery box cover at front left corner of the cabin, freeing the vent and overflow tubes from the battery, and pulling the battery and shelf aft into the cabin. The battery is vented by a plastic tube extending through the left side of the battery box, through the clutch compartment, and then through the left side of the helicopter. The installation incorporates a plastic overflow tube extending through the right side of the battery box, a battery sump jar containing a pad saturated with a neutralizing agent, and a plastic vent tube leading from the battery sump jar down through the canted bulkhead. The area surrounding the battery is coated with acid-resistant lacquer.

12–69. Removal. a. Place BATT switch in OFF position and disconnect external power source from external power receptacle.

b. On helicopters serial No. 56-4313 and subsequent, remove battery box access door at front left corner of cabin.

c. Disconnect battery leads by removing quick disconnect battery plug (2, figure 12–28 or 8, figure 12–7).

d. Disconnect vent and overflow tubes from battery (1, figure 12–28 or 6, figure 12–7).

e. On helicopters serial No. 56-4313 and subsequent, remove retaining pin (7, figure 12–7) and slide battery (6) and shelf aft into cabin.

f. Unsnap hold-down clamps and remove battery from rack or shelf.

12–70. Cleaning. a. Clean battery connections and entire battery surface with a cloth dampened with a solution of sodium bicarbonate (item 18, table 1–8) and water (1 pound per gallon). Dry thoroughly with a clean, dry cloth.

Caution

Sodium bicarbonate is destructive to unpainted aluminum and should not be used while battery is installed in helicopter.

Note

If battery is heavily corroded, saturate corroded surfaces with sodium bicarbonate and allow to stand for approximately 5 minutes. Then flush the surface with clean water and dry battery thoroughly.

b. Clean battery compartment in accordance with paragraph 1–67.

c. Check vent and overflow tubes for pockets and obstructions. Disconnects tubes and clean by inserting a small tube and blowing tubes clear.

Warning

Do not put mouth directly to vent or overflow tube since severe acid burns may result.

12–71. Inspection. a. Check insulation of battery leads for corrosion, wear, and damage.

b. Inspect battery for leakage of acid due to broken case, softening or cracking of sealing compound, or leakage around terminals.

Note

If any leakage is found, replace battery.

c. Inspect vent and overflow tubes for cracks, deterioration, and damage.

12–72. Testing. a. Check specific gravity of the electrolyte with a temperature-corrected hydrometer. If such a hydrometer is not available, use any hydrometer and make temperature corrections from table 12–3. When filling hydrometer, draw off just enough electrolyte to raise hydrometer float from its plug at bottom of tube. Always return test fluid to cell from which it was taken to avoid concentrating too much or too little in any one cell. Replace battery if temperature-corrected hydrometer reading is below 1.240 or above 1.300. If electrolyte level is too low to permit a hydrometer reading, return battery for shop servicing or add water as directed in step *b.*

Table 12–3. Hydrometer correction table

ELECTROLYTE TEMP DEGREES F		SPECIFIC GRAVITY CORRECTION
140°		0.024
130°	ADD	0.020
120°	TO	0.016
110°	READING	0.012
100°		0.008
90°	NO	
80°	CORRECTION	
90°	REQUIRED HERE	
60°		0.008
50°		0.012
40°		0.016
30°	SUBTRACT	0.020
20°	FROM	0.024
10°	READING	0.028
0°		0.032
–10°		0.036
–20°		0.040
–30°		0.044

Warning

Avoid contact with battery electrolyte (acid) as it will burn skin and clothing. If electrolyte is spilled, flush affected area of skin with water, coat with sodium bicarbonate, and flush again with water.

b. If electrolyte level is too low to be seen or for hydrometer readings to be taken, add water with self-leveling syringe. If available, use distilled water; otherwise drinking water will be satisfactory. Hold syringe in vertical position and, regardless of electrolyte level, fill cell. Then withdraw water into syringe until air is sucked in. This should leave electrolyte at a proper level (about 3/8 inch above separator protectors). After adding water allow several minutes of charging before taking hydrometer reading, otherwise reading will be inaccurate.

Caution

Do not rest hydrometer across top of battery as leaking acid will damage metal parts.

Caution

If battery is exposed to temperatures below freezing, do not add water unless battery is to be charged immediately, as water will remain on top and freeze.

12–73. Installation. a. Place BATT switch in OFF position and disconnect external power source from external power receptacle.

b. On helicopters serial No. 56-4313 and subsequent, remove retaining pin (7, figure 12–7) and slide battery shelf aft into cabin.

c. Place battery in rack or shelf. Engage rods with bar on top of battery cover. Tighten holddown clamps.

Caution

Freshly charged batteries should be left uncapped for 24 hours prior to installation to allow hydrogen vapors to disperse.

d. On helicopters serial No. 56-4313 and subsequent, slide battery and shelf as far forward as possible. Insert retaining pin (7) to lock shelf in position.

e. Connect vent and overflow tubes to battery.

Caution

Damaged or improperly installed elbows and tubes can allow electrolyte to leak from battery and cause corrosion of adjacent metal surfaces.

f. Connect battery. Turn wheel of quick disconnect battery plug (2, figure 12–28 or 8, figure 12–7) to lock position.

g. On helicopters serial No. 56-4313 and subsequent, install battery box cover.

12–74. Battery Sump Jar. The battery sump jar is a 1 pint glass jar mounted on the right side of the battery rack or shelf. A plastic overflow tube connects with the battery case and the top of the battery jar. A plastic overflow tube vents the battery sump jar to the exterior of the helicopter. The battery sump jar contains a pad that has been saturated with an acid neutralizing agent.

12–75. Removal. a. Remove battery. (Refer to paragraph 12–69.)

b. Remove vent and overflow tubes from top of battery sump jar.

c. Loosen mounting strap by removing screw and lockwasher. Remove battery sump jar.

12–76. Cleaning. Clean battery sump jar by washing with a solution of sodium bicarbonate (item 18, table 1–8) and water (1 pound per gallon); rinse with clean water.

Note

After cleaning, place a new acid neutralizing pad in battery sump jar.

12–77. Inspection. Inspect battery sump jar for chipping, cracks, or breaks.

12–78. Installation. a. Place battery sump jar on mounting bracket. Tighten mounting strap with screw and lockwasher.

b. Connect vent and overflow tubes to top of battery sump jar.

c. Install battery. (Refer to paragraph 12–73.)

12–79. Battery Switch. The battery switch, located on the main switch panel (2, figure 12–1 or 3, figure 12–2), is a single-pole, double-throw switch, and is marked BATT and OFF. The battery switch is closed by placing it in BATT position, and when closed, the battery relay is energized connecting the battery supply circuit to the primary supply circuit.

12–80. Removal. For removal procedure of battery switch, refer to paragraph 12–34*a*.

12–81. Inspection. For inspection procedure of battery switch, refer to paragraph 12–34*b*.

12–82. Installation. For installation procedure of battery switch, refer to paragraph 12–34*c*.

12–83. Battery Relay. On helicopters serial No. prior to 56-4313, the battery relay (10, figure 12–4) is located in the power relay junction box on the right side of the forward bulkhead of the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the battery relay (3, figure 12–7) is located behind the fuse and circuit breaker panel (5) in the battery box. The battery relay connects the battery supply circuit to the primary supply circuit when battery switch is in BATT position.

12–84. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. prior to 56-4313, release fastners and remove cover from power relay junction box (11, figure 12–1) in electronics compartment. On helicopters serial No. 56-4313 and subsequent, remove cover from fuse and circuit breaker panel (23, figure 12–2). Release catch at each side of panel and shelf assembly (27) and lower panel and shelf assembly.

Warning

Short circuits may cause fires that would damage equipment or injure personnel. Before removing cover be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

c. Remove nuts and washer securing primary bus bar. Remove primary bus bar and brass washers.

d. Disconnect electrical wires from battery relay (10, figure 12–4 or 3, figure 12–7).

e. Remove screws and washers securing battery relay. Remove battery relay.

12–85. Inspection. Inspect battery relay for corrosion, cracks, indications of overheating, arcing, or burning, and loose or damaged components.

12–86. Installation. a. On helicopters serial No. prior to 56-4313, position battery relay (10, figure 12–4) in power relay junction box, located in electronics compartment. On helicopters serial No. 56-4313 and subsequent, position battery relay (3, figure 12–7) on panel and shelf assembly, located in battery box.

Warning

Short circuits may cause fires that would damage equipment or injure personnel. Before installing battery relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

b. Secure battery relay in position with screws and washers. Connect electrical wires to proper terminals on battery relay.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

c. Position brass washers and primary bus bar on battery relay and secure with washers and nuts.

Note

If there are variations in height of relays (battery, external power, starter, or bus-tie), build up lower relays with AN961-616 washers and AN361-616 nuts as required. (See figures 12–4 and 12–7.)

d. On helicopters serial No. prior to 56-4313, install cover on power relay junction box (11, figure 12–1) and secure with fasteners. On helicopters serial No. 56-4313 and subsequent, raise panel and shelf assembly (27, figure 12–2) into level position and secure. Install cover and secure with fasteners.

Warning

Short circuits in power relay junction box may cause fires that would damage equipment or injure personnel. Before replacing cover, be sure all electrical connections are properly made and that no foreign objects are left in power relay junction box.

e. Connect battery.

Section IV Generator

12–87. Description. The generator section consists of a generator, generator blower, generator switch, voltage regulator, overvoltage relay, generator field control relay, reverse current cut-out relay, generator failure warning light, and generator failure warning light relay.

12–88. Generator. The generator (1, figure 12–29) is mounted at the lower left rear of the main transmission assembly. The generator is rated at 30 volts dc, 200 amperes, at 3000 rpm. The generator is cooled by a duct connected generator blower (2) mounted adjacent to it. The generator is driven by accessory drive gears on the main transmission assembly and operates only when the engine is in operation and the clutch is engaged. The generator shunt field terminal A connects to terminal N on the generator field control relay. The generator output terminal B connects to the GEN terminal on the reverse current cut-out relay. Terminal D, the generator field terminal, connects to the D terminal on the voltage regulator. The generator ground terminal E connects through the ammeter shunt to the helicopter structure. (See figure 12–3.)

12–89. Removal. a. Place BATT switch in OFF position and GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. Lower left-hand and right-hand service platform to gain access to main transmission assembly.

c. Remove clamp (2, figure 12–30) and disconnect duct (1) from generator (3).

d. Disconnect electrical wires from A, B, D, and E terminals of generator (3).

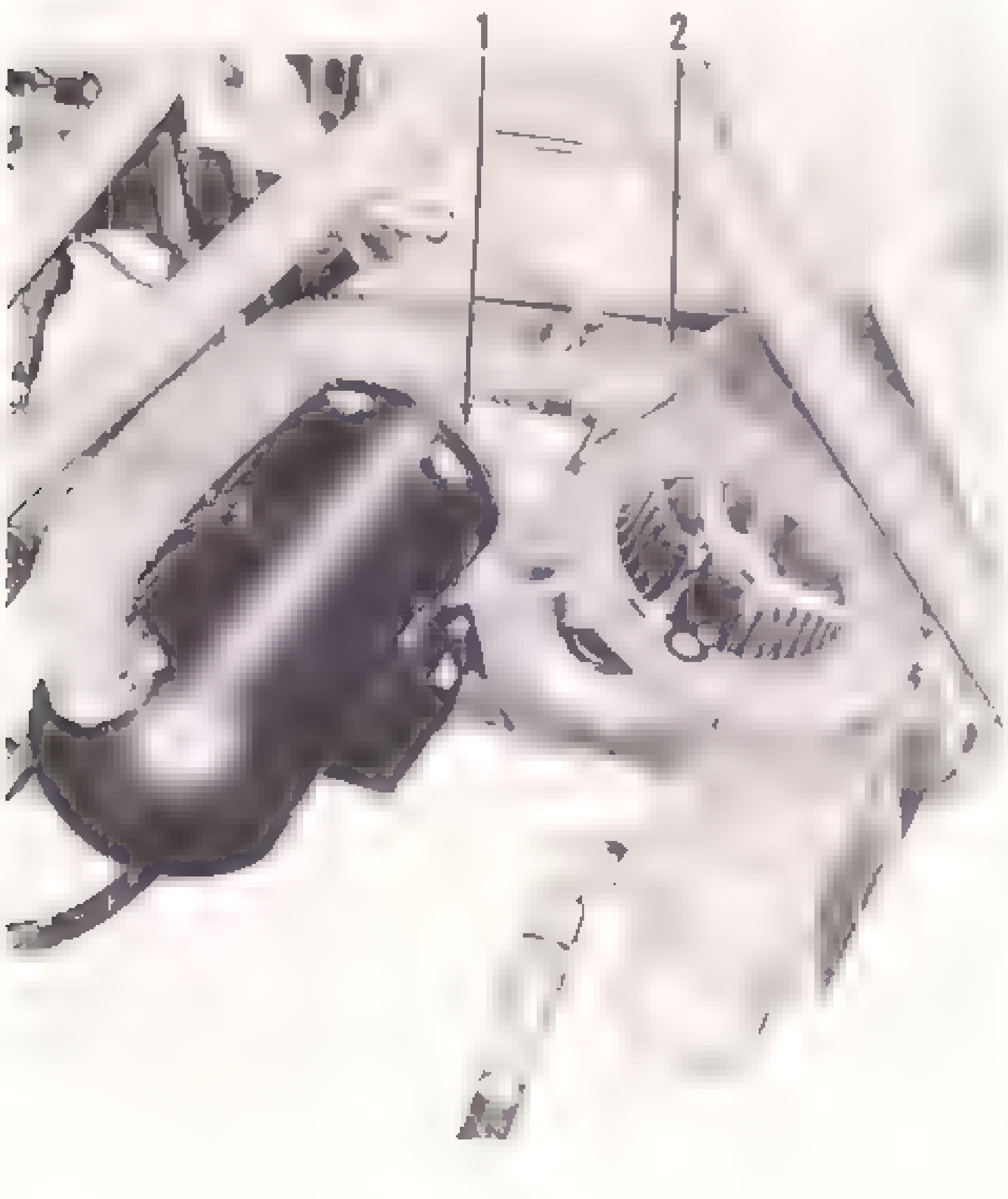
e. Support generator (3) and remove nuts (4), washers (5), and gaskets (6) from rear cover studs.

f. Remove generator (3) and remove gasket assembly (8) and plugs (7). Remove adapter (9) from recess in rear cover of main transmission assembly.

12–90. Cleaning. a. Clean external surfaces of generator by wiping with a cloth (item 49, table 1–8) dampened with dry cleaning solvent (item 4, table 1–8).

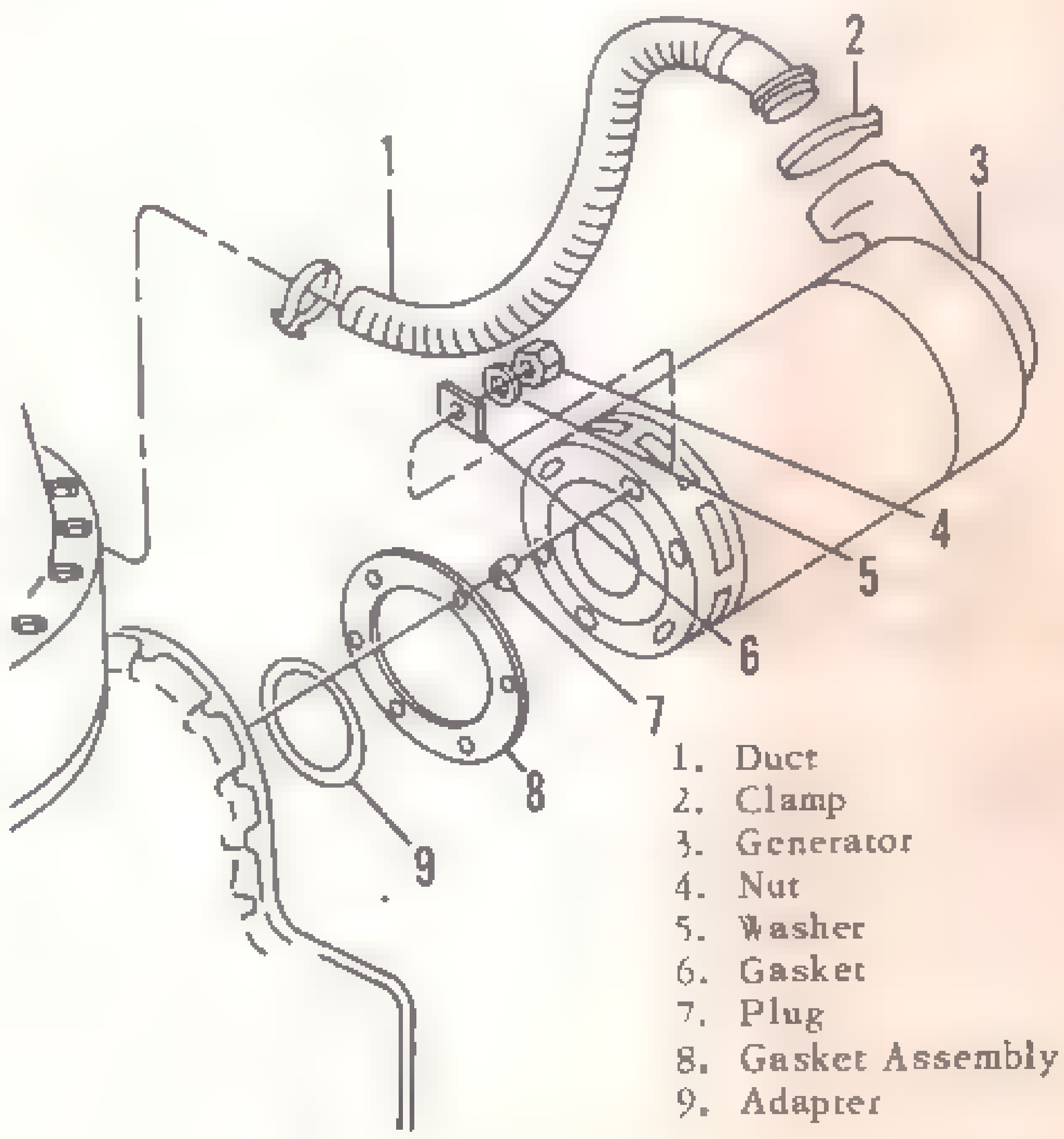
Caution

Clean generator commutator with a clean, dry, lint-free cloth (item 49, table 1–8) only. Do not remove the commutator film, which appears as a discoloration, under any circumstances. This film is required for satisfactory generation operation and its removal could result in rapid brush wear, overheated armature, poor commutation, and subsequent loss of electrical power.



1. Generator
2. Generator Blower

Figure 12–29. Generator installed



1. Duct
2. Clamp
3. Generator
4. Nut
5. Washer
6. Gasket
7. Plug
8. Gasket Assembly
9. Adapter

Figure 12–30. Removal of generator

b. Clean sticking generator brushes with a clean, dry, lint-free cloth (item 49, table 1–8).

c. Clean adapter, plugs, and cover assembly with dry cleaning solvent (item 4, table 1–8).

12–91. *Inspection. a.* Inspect generator for corrosion, cracks, and loose or damaged components.

b. Inspect generator brushes for chips, cracks, breaks, and proper length. Generator brush length should be 1/2-inch or greater.

Note

Replace generator brushes that are less than 1/2-inch long.

c. Check spring tension of brush spring rigging. Spring tension should be between 60 and 66 ounces.

Note

If spring tension is not within limits, replace generator.

d. Inspect generator commutator for burning, roughness, excessive scoring, pitting, or eccentric.

Note

Replace generator if any of the above defects exist.

12–92. *Repair or replacement.* Repair of generator consists of replacing unserviceable generator brushes with serviceable generator brushes as follows:

a. Disconnect brush leads by removing screws. Lift up brush springs, using a suitable tool, and remove brush.

b. Lift up brush springs, using a suitable tool, and install new brushes. Connect brush leads by installing screws.

c. Seat new brushes by wrapping fine cloth (item 23, table 1–8) around commutator, with sanded surface next to brushes, and pull in direction of armature rotation. Keep cloth to the same contour as surface of commutator. Repeat operation until brushes are completely seated.

Caution

Do not use coarse sandpaper or emery cloth of any type. Remove all sand and brush dust with dry compressed air.

12–93. *Installation. a.* Fill generator gear drive cavity with grease (item 52, table 1–8) so that grease will be forced through generator shaft splines.

b. Gently tap adapter (9, figure 12–30) into recess in rear cover of main transmission assembly until adapter is bottomed. Adapter must be bottomed and parallel with rear cover to avoid misalignment of generator shaft.

c. Measure clearance between two rings of the large circular gasket assembly with a feeler gage. Take this measurement at each of the six spaces in gasket assembly. Record minimum clearance and mark location with chalk.

d. Position gasket assembly (8) on rear cover studs.

e. Insert plug (7) in each hole in mounting flange of generator (3).

f. Position generator (3) on rear cover studs.

g. Install gasket (6) on each rear cover stud with rubber side against mounting flange of generator (3). Install nuts (4) and tighten evenly around stud circle measuring clearance between rings of large circular gasket assembly at each six spaces until clearance is 0.010 inch less than the minimum clearance previously measured (refer to step *c*).

Note

Use washers (5) only if required to keep nuts (4) from bottoming. Do not use washers if their use prevents required number of threads from showing.

h. Install duct (1) on generator (3) and secure with clamp (2).

i. Connect electrical wire to proper terminals (A, B, D, and E) on generator.

Note

Refer to applicable wiring diagram for proper electrical wire connection.

j. Close and secure left-hand and right-hand platforms.

k. Connect battery.

12–94. *Flashing generator field.* The field coil of the generator is energized through the GEN FIELD circuit breaker on the overhead control panel and the generator field control relay when primary bus is energized. The battery is used as a source of power for excitation of the generator field. Therefore, since the generator does not depend on residual magnetism for field excitation, it is not necessary to flash the generator field. Check to see that generator field control relay is functioning properly if generator fails to build up voltage.

12–95. Generator Blower. The generator blower (2, figure 12–29) is mounted at the lower right rear of the main transmission assembly adjacent to the generator. The generator blower utilizes a squirrel-cage type fan to create forced air to cool the generator (1). The generator blower operates only when the engine is in operation and the clutch is engaged.

12–96. *Cleaning.* Clean external surfaces of the generator blower by wiping with a cloth (item 49, table 1–8) dampened with solvent (item 4, table 1–8).

12–97. *Inspection. a.* Inspect generator blower for corrosion, cracks, and security.

b. Inspect cooling fan for indications of binding and damage.

c. Inspect screen for damage and security.

12–98. Generator Switch. The generator switch is a guarded, double-pole, double-throw switch, located on the main switch panel (12–10 or 12–11) on the instrument panel. The generator switch has three positions: GEN, GEN OFF, and RESET. The generator switch is spring loaded, momentarily closed to the RESET position in which the generator switch must be held. In the GEN position, the generator output is connected to the overvoltage relay and the generator field control relay. When the generator switch is in RESET position, the reset coil of the generator field control relay is energized from the primary supply circuit.

12–99. Removal. For removal procedure of generator switch, refer to paragraph 12–34*a.*

12–100. Inspection. For inspection procedure of generator switch, refer to paragraph 12–34*b.*

12–101. Installation. For installation procedure of generator switch, refer to paragraph 12–34*c.*

12–102. Voltage Regulator. On helicopters serial No. prior to 56-4313, the voltage regulator (figure 12–31) is located on the forward end of the right shelf in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the voltage regulator (figure 12–32) is located on the top shelf at the right side of the forward bulkhead in the electronics compartment. The voltage regulator is designed to maintain a generator output between 27.2 and 28.8 volts. Generator output connects to terminal B on the voltage regulator and passes through the carbon pile regulator resistance to terminal D which connects to the generator field terminal D. A screw-type adjustment is provided for regulating the resistance. Variations in generator output cause variations in the carbon pile regulator resistance. These variations, in turn, produce compensating changes in generator field voltage which maintains a relatively constant voltage output.

12–103. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. Release fasteners and remove shield that is installed over voltage regulator.

c. Press two clips, located at right of regulator base, to right to free them from tabs on voltage regulator. Remove voltage regulator from regulator base.

d. Disconnect electrical wires from terminals on regulator base.

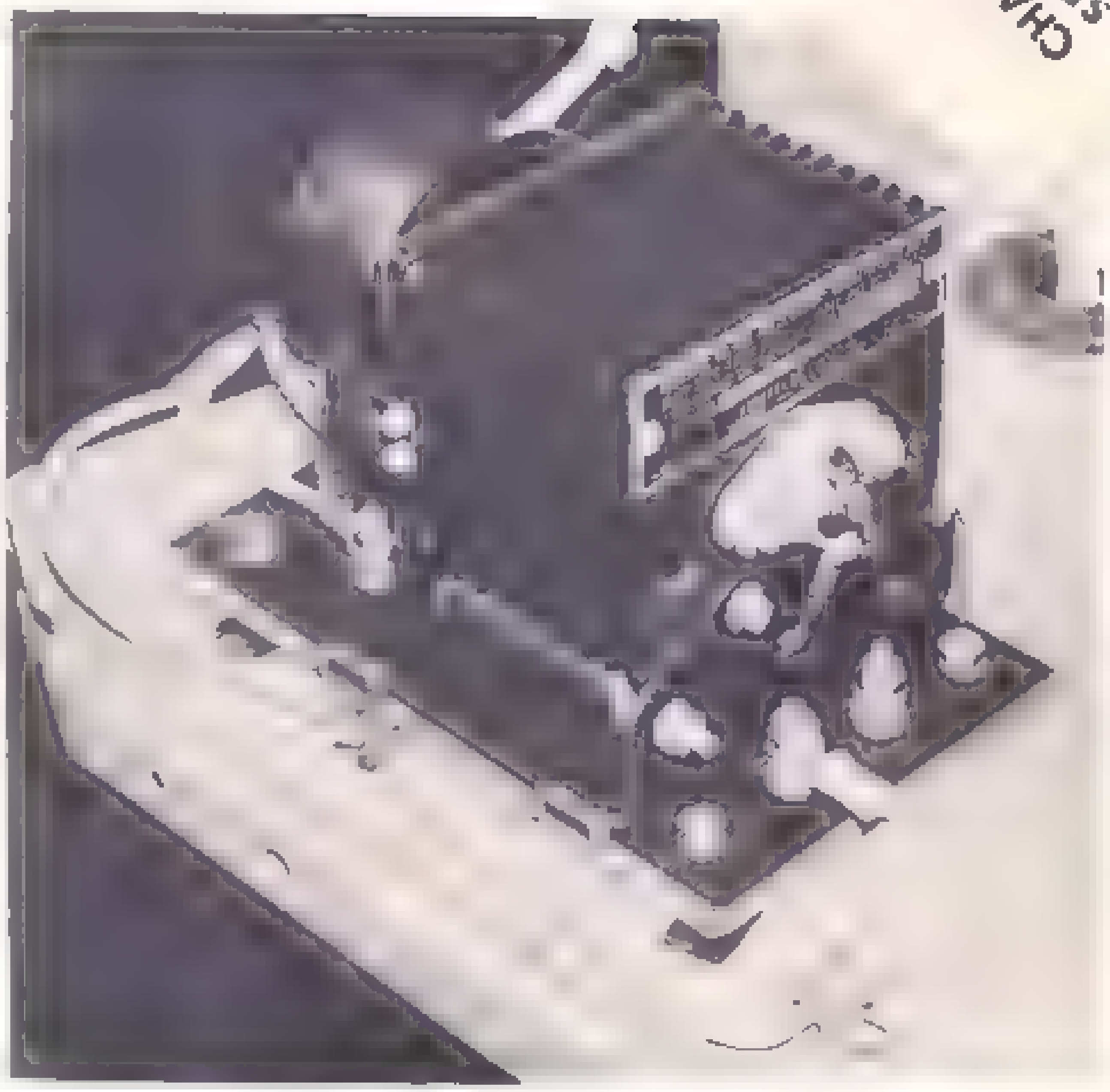
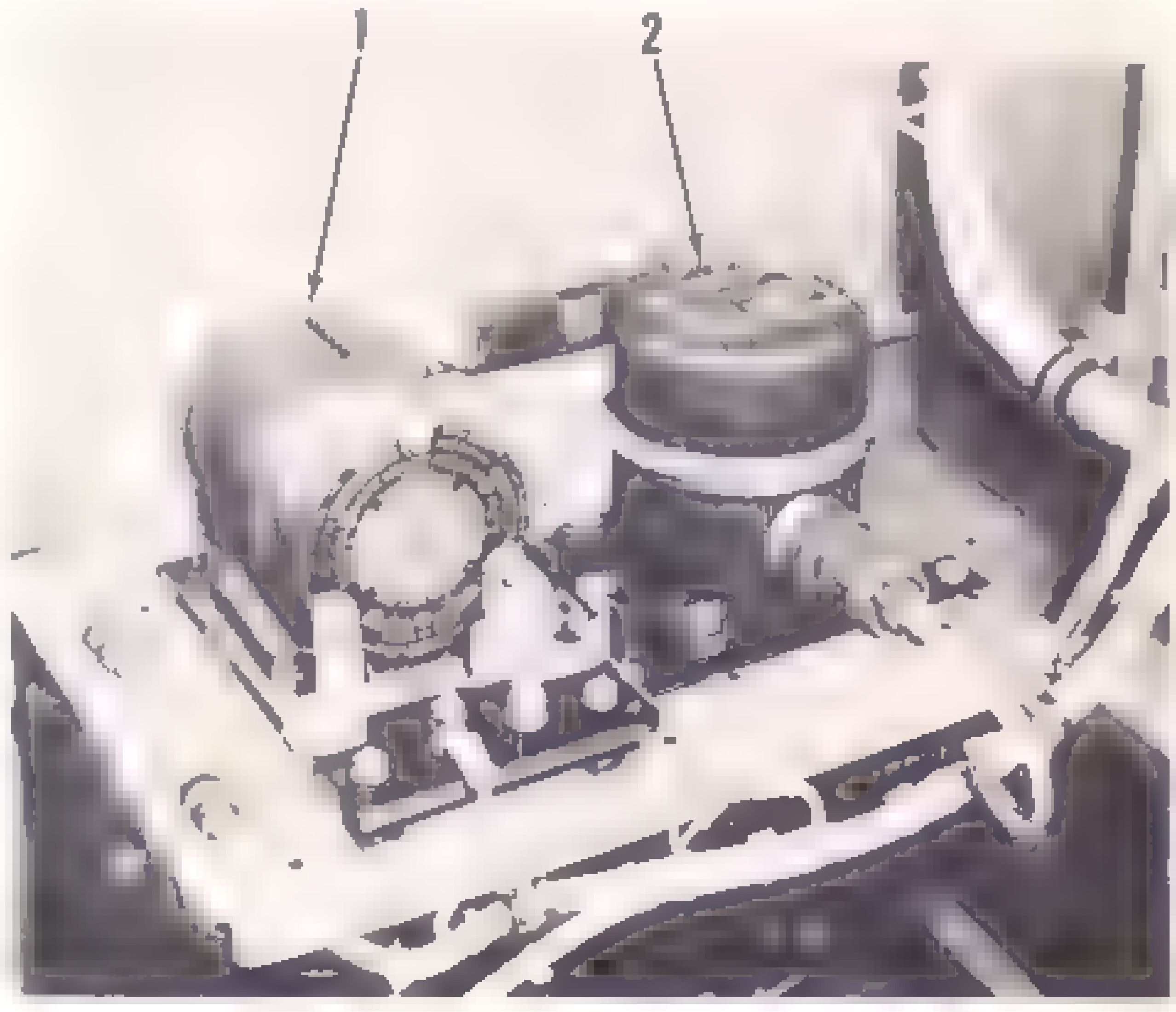


Figure 12–31. Voltage regulator installed (cover removed) (helicopters serial No. prior to 56-4313)



1. Voltage Regulator 2. Light Flasher

Figure 12–32. Voltage regulator (cover removed) and light flasher installed (helicopters serial No. 56-4313 and subsequent)

e. Remove washers and nuts from lower end of each stud that secures regulator base to shelf. Remove regulator base.

12–104. Inspection. a. Inspect regulator for corrosion, cracks, indications of arcing or burning, and loose or damaged components.

b. Inspect regulator base for corrosion, cracks, damaged terminals, loose or broken components, and indications of arcing or burning.

12–105. Installation. a. Position regulator base on shelf with two vertical clips at right and studs through holes in shelf. Secure regulator base by installing a washer and nut on lower end of each stud.

b. Connect electrical wires to proper terminals on regulator base.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

c. Engage two tabs on left side of voltage regulator with brackets on left side of regulator base. Lower voltage regulator into position on regulator base. Engage two clips at right side of regulator base with tabs on voltage regulator to secure voltage regulator.

d. Position shield over voltage regulator and secure with fasteners.

e. Connect battery.

12–106. Adjustment. Adjust generator voltage as follows:

Note

The generator and voltage regulator should be at operating temperature before adjustment is made. However, due to inadequate engine cooling, warmup time on ground is governed by limitations of engine and final adjustment of generator voltage should be made in the air, if necessary.

a. Connect positive lead of a portable precision voltmeter to B terminal of voltage regulator and negative lead to a good ground (helicopter structure).

b. After normal engine warmup and with qualified personnel at controls of helicopter, increase engine speed to normal cruising rpm.

c. Place a load on generator as near equal as possible to one-half its full load rating as indicated by ammeter (loadmeter) on instrument panel. For load rating see figure 1–2.

d. Precision voltmeter should indicate exactly 28.0 volts. If not, adjust generator voltage by means of voltage control on voltage regulator.

e. Disconnect and remove precision voltmeter.

12–107. Overvoltage Relay. On helicopters serial No. prior to 56-4313, the overvoltage relay (16, figure 12–1) is located on the forward end of the right shelf in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the overvoltage relay (28, figure 12–2) is located in the center of the panel and shelf assembly (27) in the battery box (19). In the event of an overvoltage condition, due to failure of the voltage regulator, the overvoltage relay connects the trip coil of the generator field control relay (25) to the primary supply circuit. The overvoltage relay operates on 31 to 33 volts.

12–108. Operational Check. a. Check to insure that all switches are in OFF position. Circuit breakers in power circuits for normally on inverters or dynamotors should also be placed in off position.

b. Install temporary jumper between terminals A and B on voltage regulator.

c. Connect a voltmeter, 0 to 50 volts dc, between B connection on voltage regulator and ground.

d. Provide an external power source and start engine. Operate engine until stabilized operation is obtained.

e. Increase engine rpm gradually until voltmeter at B connection on voltage regulator registers 33 or 34 volts.

Caution

Do not allow voltage to go higher than 34 volts under any circumstance. Hold engine speed to maintain 33 or 34 volts output for approximately 10 seconds.

f. If overvoltage relay fails to operate, replace overvoltage relay.

Note

When overvoltage relay disconnects generator from main distribution bus, voltage should drop to approximately 2 volts.

g. Disconnect and remove voltmeter. Remove jumper from terminals A and B of voltage regulator.

h. Momentarily place GEN switch in RESET position and return switch to GEN position. Check generator system for specified voltage and proper operation. For testing of dc power system, refer to paragraph 12–4*b*.

12–109. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. 56-4313 and subsequent, remove cover from battery box (19, figure 12–2).Remove cover from fuse and circuit breaker panel (23). Release catch at each side of shelf and lower shelf.

c. Remove screws, washers, and nuts that secures overvoltage relay to shelf. Remove nuts and washers securing cover over electrical terminals of overvoltage relay. Remove cover.

d. Disconnect electrical wires from overvoltage relay. Remove overvoltage relay.

12–110. Inspection. Inspect overvoltage relay for corrosion, cracks, indications of overheating, arcing or burning, and loose or damaged components.

12–111. Installation. a. Connect electrical wires to proper terminals of overvoltage relay.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

b. Install cover over terminals and secure with washers and nuts.

c. Position overvoltage relay on shelf and secure with screws, washers, and nuts.

d. On helicopters serial No. 56-4313 and subsequent, raise shelf into level position and secure. Install cover on fuse and circuit breaker panel (23, figure 12–2). Install cover on battery box (19).

e. Connect battery.

12–112. Generator Field Control Relay. On helicopters serial No. prior to 56-4313, the generator field control relay (15, figure 12–1) is located on the forward end of the right shelf in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the generator field control relay (25, figure 12–2) is located on the left side of the panel and shelf assembly (27) in the battery box (19). The generator field control relay contains a trip coil, a reset coil, and relay contacts. When the trip coil is energized by operation of the overvoltage relay (28), the relay contacts are opened to disconnect generator output from both the primary supply circuit and from the generator field. This prevents possible damage to both dc equipment and the generator itself because of excessively high voltage. The generator failure warning light, located adjacent to the GEN switch, will come on when the trip coil is energized. When reset coil is energized by momentarily placing GEN switch in RESET position, the relay contacts are closed to place the generator back in normal operation.

12–113. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. 56-4313 and subsequent, remove cover from battery box (19, figure 12–2). Remove cover from fuse and circuit breaker panel (23). Release catch at each side of shelf and lower shelf.

c. Remove lockwire and disconnect electrical plug from generator field control relay.

d. Remove screws, washers, and nuts that secure generator field control relay to shelf. Remove generator field control relay.

12–114. Inspection. Inspect generator field control relay for corrosion, cracks, indications of overheating, and loose or damaged components.

12–115. Installation. a. Position generator field control relay on shelf and secure with screws, washers, and nuts.

b. Connect electrical plug to generator field control relay and secure electrical plug with lockwire.

c. On helicopters serial No. 56-4313 and subsequent, raise shelf into level position and secure. Install cover on fuse and circuit breaker panel (23, figure 12–2).

d. Connect battery.

12–116. Reverse Current Cut-Out Relay. On helicopters serial No. prior to 56-4313, the reverse current cut-out relay is located in the power relay junction box (11, figure 12–1) on the forward bulkhead in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the reverse current cut-out relay is located in the dc power junction box (9, figure 12–2) on the left side of the canted bulkhead in the transmission compartment. The reverse current cut-out relay (1, figure 12–4 or 1, figure 12–5) automatically connects generator output to the primary supply circuit if the GEN switch is in the GEN position. When generator voltage builds up to exceed battery voltage by more than 0.35 volt, the reverse current cut-out relay operates to connect the generator output at the GEN terminal through the relay to the BATT terminal and hence to primary supply circuit. Conversely, when generator voltage drops below battery voltage, the reverse current cut-out relay disconnects the generator from the primary supply circuit. The operation of the reverse current cut-out relay stops the flow of reverse current in excess of 25 amperes from the battery to the generator thus preventing damage to the generator. When such a drop in generator voltage occurs, the generator failure warning light, located adjacent to GEN switch, is illuminated to indicate generator failure.

12–117. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. prior to 56-4313, release fasteners and remove cover from power relay junction box (11, figure 12–1) in electronics compartment. On helicopters serial No. 56-4313 and subsequent, release fasteners and remove cover from dc power junction box (9, figure 12–2) on left side of canted bulkhead in transmission compartment.

Warning

Short circuits in power relay junction box may cause fires that would damage equipment or injure personnel. Before removing covers, be sure BATT and GEN switches are OFF and GEN OFF positions and that battery and external power source are disconnected.

c. Remove reverse current cut-out relay (1, figure 12–4) as follows:

(1) Disconnect electrical wires from reverse current cut-out relay (1).

(2) Remove nuts and washers securing primary bus bar (2). Remove primary bus bar.

(3) Remove screws and washers securing reverse current cut-out relay (1). Remove reverse current cut-out relay from power relay junction box.

d. Remove reverse current cut-out relay (1, figure 12–5) as follows:

(1) Disconnect electrical wires from reverse current cut-out relay (1).

(2) Remove nuts and washers securing primary bus bar. Remove primary bus bar.

(3) Remove screws, washers, and nuts securing reverse current cut-out relay (1). Remove reverse current cut-out relay from dc power relay junction box.

12–118. *Inspection.* Inspect reverse current cut-out relay for corrosion, cracks, indications of overheating, arcing, or burning, and damaged terminals.

12–119. *Installation.* Before installing a reverse current cut-out relay, part No. AN3025-1, check that resistance reading between AAP and SW terminals is between 560 and 610 ohms. If resistance is 0, connect positive side of 1.5-volt battery to BATT terminal and negative side to T terminal under nameplate. A click should be heard in the reverse current cut-out relay. After removing battery, resistance reading should be correct and reverse current cut-out relay ready for installation.

Warning

Short circuits in power relay junction box may cause fires that would damage equipment or injure personnel. Before installing reverse current cut-out relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

a. Install reverse current cut-out relay (1, figure 12–4) as follows:

(1) Position reverse current cut-out relay in power relay junction box and secure with screws and washers.

(2) Install primary bus bar (2) and secure with nuts and washers.

Note

If there are variations in height of relays (starter, bus-tie, external power, and battery), build up mounting surface under primary bus bar (2) with not more than one AN961-616 washer and one AN341-616 nut on each of the low relays. If it is necessary to install a washer or nut, check to be sure that brass washer is positioned so that it will mate with primary bus bar.

(3) Connect electrical wires to proper terminals on reverse current cut-out relay (1).

Note

For correct electrical wire connection, refer to applicable wiring diagram.

b. Install reverse current cut-out relay (1, figure 12–5) as follows:

(1) Position reverse current cut-out relay (1) in dc power relay junction box and secure with screws, washers, and nuts.

(2) Install primary bus bar and secure with nuts and washers.

Note

Install one AN341-616 nut on terminal of bus-tie relay (2) under primary bus bar.

(3) Connect electrical wire to proper terminals on reverse current cut-out relay.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

c. On helicopters serial No. prior to 56-4313, install cover on power relay junction box (11, figure 12–1) and secure with fasteners. On helicopters serial No. 56-4313 and subsequent, install cover on dc power relay junction box (9, figure 12–2) and secure with fasteners.

Warning

Before installing cover, be sure all electrical connections are properly made and secure and that no foreign objects are left in power relay junction box. Short circuits in power relay junction box can cause fires that could damage equipment or injure personnel.

d. Connect battery.

12–120. Generator Failure Warning Light.

The generator failure warning light, marked GEN OFF, is located on the main switch panel (2, figure 12–1 or 3, figure 12–2) and indicates that there is no generator output to the primary supply circuit. The generator failure warning light is connected to the primary supply circuit through the contacts of the generator warning light relay. If the generator failure warn-

ing light comes on, partial or complete generator failure is indicated. The generator failure warning light is dimmed during night operation by a resistor in the warning light dimming relay circuit. The generator failure warning light is of the push-to-test type and the bulb should be replaced if it does not light when so tested.

12–121. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. Loosen fasteners securing main switch panel to instrument panel. Pull main switch panel out from instrument panel.

Warning

Short circuits in main switch panel may cause fires that would damage equipment or injure personnel. Before pulling main switch panel from instrument panel, insure that battery leads and external power source are disconnected.

c. At rear of main switch panel, disconnect electrical wires from terminals 1, 2, and 3 on generator failure warning light.

Note

Use a suitable soldering iron to melt solder at electrical wire connections.

d. Remove nut and washer securing generator failure warning light to main switch panel. Remove generator failure warning light.

12–122. Inspection. Inspect generator failure warning light for corrosion, cracks, distortion, damaged terminals, broken lens, and damaged threads.

12–123. Installation. a. Position generator failure warning light on main switch panel and secure with washer and nut.

b. Connect electrical wires to proper terminals 1, 2, and 3 on generator failure warning light, using approved soldering method.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

c. Position main switch panel in instrument panel and secure with fasteners.

d. Connect battery.

12–124. Generator Failure Warning Light Relay. The generator failure warning light relay (6, figure 12–15, 12–16, or 12–17) is located in the electrical relay resistor box (7, figure 12–1 or 8, figure 12–2) behind the cockpit dome light panel. The generator failure warning light relay is energized and the relay contacts held open as long as there is generator output through the reverse current cut-out relay. In case of generator failure, the generator failure warning light relay is deenergized, the relay contacts close, and the generator failure warning light comes on.

12–125. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. Loosen fasteners and hinge down cockpit dome light panel (6, figure 12–1 or 7, figure 12–2) of overhead control panel.

Warning

Short circuits in overhead control panel may cause fires that would damage equipment or injure personnel. Before hinging down cockpit dome light panel, insure that battery and external power source are disconnected.

c. Disconnect electrical wires from generator failure warning light relay (6, figure 12–15, 12–16, or 12–17).

d. Remove screws and washers securing generator failure warning light relay. Remove generator failure warning light relay.

12–126. Inspection. Inspect generator failure warning light relay for corrosion, cracks, damaged terminals, and indications of overheating, arcing, or burning.

12–127. Installation. a. Position generator failure warning light relay (6, figure 12–15, 12–16, or 12–17) in electrical relay and resistor box (7, figure 12–1 or 8, figure 12–2) and secure with screws and washers.

b. Connect electrical wires to proper terminals on generator failure warning light relay.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

c. Position cockpit dome light panel (6, figure 12–1 or 7, figure 12–2) of overhead control panel in place and secure with fasteners.

d. Connect battery.

Section V Auxiliary Power

Not Applicable

Section VI Alternating Current

12–128. Description. The alternating current section consists of inverters, inverter switch, and ac power distribution system.

12–129. Inverters. On helicopters serial No. prior to 56-4313, the inverters (main and spare) (21, figure 12–1), are identical and are located at floor level on right side of the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the main inverter (22, figure 12–2) and spare inverter (21) are mounted on top of the battery box (19) in the clutch compartment. The inverters are rated 115 volts ac, 250 VA, 3 phase, 400 cycles and have self-contained starting relays. Two 28-volt dc supply circuits connect to each inverter, one to supply input voltage and one to supply operating voltage to the starting relay. The dc circuits connect to the primary bus in the fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2) through circuit breakers marked RELAY and INPUT. Operation of the inverters is controlled by the inverter switch, marked FLT INST INV–MAIN–OFF–SPARE, on main switch panel (2, figure 12–1 or 3, figure 12–2). The output of the inverters is connected directly to the ac power distribution system. (Refer to paragraph 12–137.)

Note

The two 250 VA inverters (main and spare) are replaced with two 500 VA inverters (main and spare) in helicopters equipped with automatic stabilization equipment.

12–130. Removal. a. Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

b. On helicopters serial No. 56-4313 and subsequent, remove clutch compartment access door and inverter access door.

c. Disconnect electrical wires from inverters (main and spare).

Warning

The inverters draw a heavy current and produce a high voltage. Before disconnecting electrical wires from inverters (main and spare), be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

d. Remove bolts and washers securing inverters (main and spare). Remove inverters.

12–131. Inspection. Inspect inverters for corrosion, cracks, indications of overheating, arcing, or burning, and loose or damaged components.

12–132. Installation. a. Position inverters (main and spare) on mount and secure with bolts and washers.

Warning

The inverters draw a heavy current and produce a high voltage. Before installing inverters, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power are disconnected.

b. Connect electrical wires to proper terminals on inverters (main and spare).

Note

For correct electrical wire connections, refer to applicable wiring diagram.

c. On helicopters serial No. 56-4313 and subsequent, replace inverter access door and clutch compartment access door.

d. Connect battery.

12–133. Inverter Switch. The inverter switch is located on the main switch panel (2, figure 12–1 or 3, figure 12–2) and is marked FLT INST INV–MAIN – OFF – SPARE. The inverter switch is in the 28-volt dc relay circuit to the inverters (main or spare). When the inverter switch is closed in the MAIN or SPARE position, the 28-volt dc relay circuit is closed to the main or spare inverter respectively, and the starting relay is energized to close the input circuit to the inverter in question. In normal flight operations, the inverter switch is placed in the MAIN position and the main inverter carries the entire ac load. If the main inverter fails, as indicated by the FLT INST INV – FAILURE warning light coming on, the inverter switch is placed in the SPARE position and the spare inverter replaces the main inverter. The inverter switch also controls operation of the ac-dc interlock relay. (Refer to paragraph 12–141.)

12–134. Removal. For removal procedure of inverter switch, refer to paragraph 12–34*a*.

12–135. Inspection. For inspection procedure of inverter switch, refer to paragraph 12–34*b*.

12–136. Installation. For installation procedure of inverter switch, refer to paragraph 12–34*c*.

12–137. AC Power Distribution System. The ac power is distributed through four supply circuits, three of which are 115-volt (phase A, C, and C-A) and one of which is 26-volt (phase C). (Refer to table 12–4.) The voltage output from both inverters (main and spare) is connected directly to the ac power distribution system. The ac power distribution system is energized by whichever inverter (main or spare) is set in operation by the FLT INST INV switch. An autotransformer reduces the 115-volt ac voltage output of the inverters (main and spare) to 26-volt ac voltage output to make the 26-volt supply circuit. Principal components of the ac power distribution system are the inverter failure warning light, inverter warning light relay, autotransformer, ac-dc interlock relay, necessary protective ac fuses, and an ac circuit breaker.

12–138. Inverter Failure Warning Light. The inverter failure warning light is located on the main switch panel (2, figure 12–1 or 3, figure 12–2) next to the inverter switch and is marked FLT INST INV – FAILURE. When the inverter failure warning light is on, the loss of ac power to all ac instruments is indicated. The inverter failure warning light operates from the 28-volt dc primary supply circuit and its operation is controlled by the inverter warning light relay which makes or breaks the inverter failure warning light connection to the 28-volt dc primary supply circuit. The inverter failure warning light is dimmed for night operation by the warning light dimming relay. (Refer to paragraph 12–58.) The inverter failure warning light is of the press-to-test type, and the bulb should be replaced if it does not light when so tested.

a. Removal. (1) Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Loosen fasteners securing main switch panel (2, figure 12–1 or 3, figure 12–2) to instrument panel. Pull main switch panel out from instrument panel.

Warning

Short circuits in main switch panel may cause fires that would cause damage to equipment or injure personnel. Before pulling main switch panel from instrument panel, insure that battery and external power source are disconnected.

(3) At rear of main switch panel, disconnect electrical wires from terminals 1, 2, and 3 on inverter failure warning light.

Note

Use a suitable soldering iron to melt solder at electrical wire connection.

(4) Remove nut and washer securing inverter failure warning light to main switch panel. Remove inverter failure warning light.

b. Inspection. Inspect inverter failure warning light for corrosion, cracks, distortions, damaged terminals, broken lens, and damaged threads.

c. Installation. (1) Position inverter failure warning light on main switch panel (2, figure 12–1 or 3, figure 12–2) and secure with washer and nut.

(2) Connect electrical wires to proper terminals 1, 2, and 3 on inverter failure warning light, using approved soldering methods.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(3) Position main switch panel in instrument panel and secure with fasteners.

Table 12–4. AC Power Distribution Circuits

Note: Circuits are energized by either main or spare inverter depending upon position of inverter switch.

115-VAC PHASE A	115-VAC PHASE C	115-VAC PHASE C-A	26-VAC PHASE C
J-8 Vertical Gyroscope	Fire Detector System	Inverter Warning Light Relay	Fuel Pressure System
Fuel Indicator System	J-2 Compass		Engine Oil Pressure System
Fire Detector System	J-8 Vertical Gyroscope		Transmission Oil Pressure System
J-2 Compass Automatic Stabilization Equipment (Model CH-34C)	MN-100A Glide Slope Receiver (Model CH-34C serial No. 57-1742 and subsequent)		Auxiliary Hydraulic Pressure System Primary Hydraulic Pressure System

(4) Connect battery.

12–139. Inverter Failure Warning Light Relay. The inverter failure warning light relay (7, figure 12–15, 12–16, or 12–17) is located in the electrical relay and resistor box (7, figure 12–1 or 8, figure 12–2) behind the cockpit dome light panel (6, figure 12–1 or 7, figure 12–2). The solenoid of the inverter failure warning light relay forms the 115-volt ac, phase C-A distribution circuit, and thus places a load across phase A and phase C inverter output to provide better balanced inverter load. The solenoid is energized and the FLT INST INV FAILURE warning light is off as long as either inverter (main and spare) is operating.

a. Removal. (1) Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Remove screws and washers securing cockpit dome light panel (6, figure 12–1 or 7, figure 12–2). Hinge down cockpit dome light panel.

Warning

Short circuits in electrical relay and resistor box may cause fires that would damage equipment or injure personnel. Before hinging cockpit dome light panel down, be sure that BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

(3) Disconnect electrical wires from inverter failure warning light (7, figure 12–15, 12–16, or 12–17).

(4) Remove screws and washers securing inverter failure warning light relay. Remove inverter failure warning light relay.

b. Inspection. Inspect inverter failure warning light relay for corrosion, cracks, indications of overheating, arcing, or burning, and damaged terminals.

c. Installation. (1) Position inverter failure warning light relay in electrical relay and resistor box (7, figure 12–1 or 8, figure 12–2) and secure with screws and washers.

Warning

Short circuits in electrical relay and resistor box may cause fires that would damage equipment or injure personnel. Before installing inverter failure warning light relay, be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

(2) Connect electrical wires to proper terminals on inverter failure warning light relay.

Note

For correct electrical wire connections, refer to applicable wiring diagram.

(3) Hinge cockpit dome light panel (6, figure 12–1 or 7, figure 12–2) in place and secure with screws and washers.

Warning

Before installing cockpit dome light panel, be sure all electrical connections are properly made and secure and that no foreign objects are left in electrical relay and resistor box. Short circuits in electrical relay and resistor box can cause fires that could damage equipment or injure personnel.

(4) Connect battery.

12–140. Autotransformer. On helicopters serial No. prior to 56-4313, the autotransformer (18, figure 12–1) is located in the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the autotransformer (20, figure 12–2) is located on the right side of the battery box (19) on the panel and shelf assembly. The autotransformer is energized from the 115-volt ac, phase c inverter output circuit. Autotransformer is tapped at 26 volts to supply the 26-volt ac, phase C distribution circuit.

a. Removal. (1) Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) On helicopters serial No. 56-4313 and subsequent, remove cover from fuse and circuit breaker panel (23, figure 12–2). Release catch at each side of panel and shelf assembly (27) and lower panel and shelf assembly.

(3) Disconnect electrical wires from autotransformer (18, figure 12–1 or 20, figure 12–2).

Warning

The inverters (main and spare) have a high voltage output. Before removing autotransformer, check to be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

(4) Remove screws, washers, and nuts securing autotransformer. Remove autotransformer.

b. Inspection. Inspect autotransformer for corrosion, cracks, damaged terminals, and indications of overheating.

c. Installation. (1) Position autotransformer (18, figure 12–1 or 20, figure 12–2) on mount and secure with screws, washers, and nuts.

Warning

The inverters (main and spare) have a high voltage output. Before installing autotransformer, check to be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

(2) Connect electrical wires to proper terminals on autotransformer.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(3) On helicopters serial No. 56-4313 and subsequent, raise panel and shelf assembly into level position and secure. Install cover on fuse and circuit breaker panel (23, figure 12–2).

(4) Connect battery.

12–141. Interlock Relay (AC-DC). On helicopters serial No. prior to 56-4316, the interlock relay (19, figure 12–1) is located on the shelf at the right side of the electronics compartment. On helicopters serial No. 56-4313 and subsequent, the interlock relay (15, figure 12–2) is located below the shelf on the right side of the forward bulkhead in the electronics compartment. The interlock relay interlocks the dc and ac power supply circuits to the J-2 gyro compass system so that both the dc and ac power supply is connected and disconnected simultaneously. This prevents either dc or ac power alone from being applied to the J-2 gyro compass system. The interlock relay contains both a dc and ac solenoid. When energized, the dc solenoid holds relay contacts in ac circuit closed and the ac solenoid holds the relay contacts in the dc circuit closed.

a. Removal. (1) Place BATT switch in OFF position and GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Disconnect electrical wires from interlock relay (19, figure 12–1 or 15, figure 12–2).

Warning

The inverters (main and spare) have a high voltage output. Before removing interlock relay, check to be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

(3) Remove screws, washers, and nuts securing interlock relay to shelf. Remove interlock relay.

b. Inspection. Inspect interlock relay for corrosion, cracks, indications of overheating, arcing, or burning, and damaged terminals.

c. Installation. (1) Position interlock relay (19, figure 12–1 or 15, figure 12–2) on shelf and secure with screws, washers, and nuts.

Warning

The inverters (main and spare) have a high voltage output. Before installing interlock relay, check to be sure BATT and GEN switches are in OFF and GEN OFF positions and that battery and external power source are disconnected.

(2) Connect electrical wires to proper terminals on interlock relay.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(3) Connect battery.

12–142. AC Fuses (Instruments). All instrument ac power circuits are protected by fuses located in the fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2) on the overhead control panel (figures 12–12, 12–13, or 12–14). Each fuse is installed in a fuse holder and secured with a cap.

a. Removal. Remove cap, fuse, and fuse holder from fuse and circuit breaker panel (5, figure 12–1, or 6, figure 12–2) as follows:

(1) Place BATT switch in OFF position and GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Loosen fasteners and hinge down fuse and circuit breaker panel of overhead control panel.

(3) Press cap to fuse holder and turn counterclockwise. Relax pressure, and remove cap and fuse.

(4) Determine fuse holder that is to be removed and disconnect electrical wires.

(5) Remove nut, washer, and lockwasher securing fuse holder to fuse and circuit breaker panel. Remove fuse holder.

b. Inspection. (1) Inspect fuse for cracks, corrosion, breakage, continuity, and loose components.

(2) Inspect cap and fuse holder for cracks, corrosion, distortion, and damage.

c. Installation. Install fuse holder, fuse, and cap on fuse and circuit breaker panel (5, figure 12–1 or 6, figure 12–2) as follows:

(1) Position fuse holder on fuse and circuit breaker panel and secure with lockwasher, washer, and nut.

(2) Connect electrical wires to proper terminals on fuse holder.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(3) Insert fuse in fuse holder and secure by pushing cap to fuse holder and turning clockwise until cap is locked in place.

(4) Hinge up fuse and circuit breaker panel and secure with fasteners.

(5) Connect battery.

12–143. AC Fuse (Autotransformer). The autotransformer ac power circuit is protected by a fuse. On helicopters serial No. prior to 56-4313, the autotransformer fuse and a spare fuse are located on the transformer fuse panel (20, figure 12–1), mounted above the spare inverter in the electronics compartments. (See figure 12–33.) On helicopters serial No. 56-4313 and subsequent, the autotransformer and spare fuse are located on the fuse and circuit breaker panel (5, figure 12–7) above the battery compartment. The autotransformer fuse is installed in a fuse holder and secured with a cap.

a. Removal. Remove cap, fuse, and fuse holder from transformer fuse panel (20, figure 12–1) on fuse and circuit breaker panel (5, figure 12–7) as follows:

(1) Place BATT switch in OFF position and place GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) On helicopters serial No. 56-4313 and subsequent, remove cover from fuse and circuit breaker panel (23, figure 12–2). Release catch at each side of panel and shelf assembly (27) and lower panel and shelf assembly.

(3) Press cap to fuse holder and turn counterclockwise. Relax pressure, and remove cap and fuse.

(4) Disconnect electrical wires from fuse holder.

(5) Remove nut, washer, and lockwasher securing fuse holder to panel. Remove fuse holder.

b. Inspection. (1) Inspect fuse for cracks, corrosion, breakage, blown condition, and loose components.

(2) Inspect cap and fuse holder for cracks, corrosion, distortion, and damage.

c. Installation. Install fuse holder, fuse, and cap on transformer fuse panel (20, figure 12–1) or fuse and circuit breaker panel (5, figure 12–7) as follows:

(1) Position fuse holder on panel and secure with lockwasher, washer, and nut.

(2) Connect electrical wires to proper terminals on fuse holder.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(3) Insert fuse in fuse holder and secure by pressing cap to fuse holder and turning clockwise until cap is locked in place.

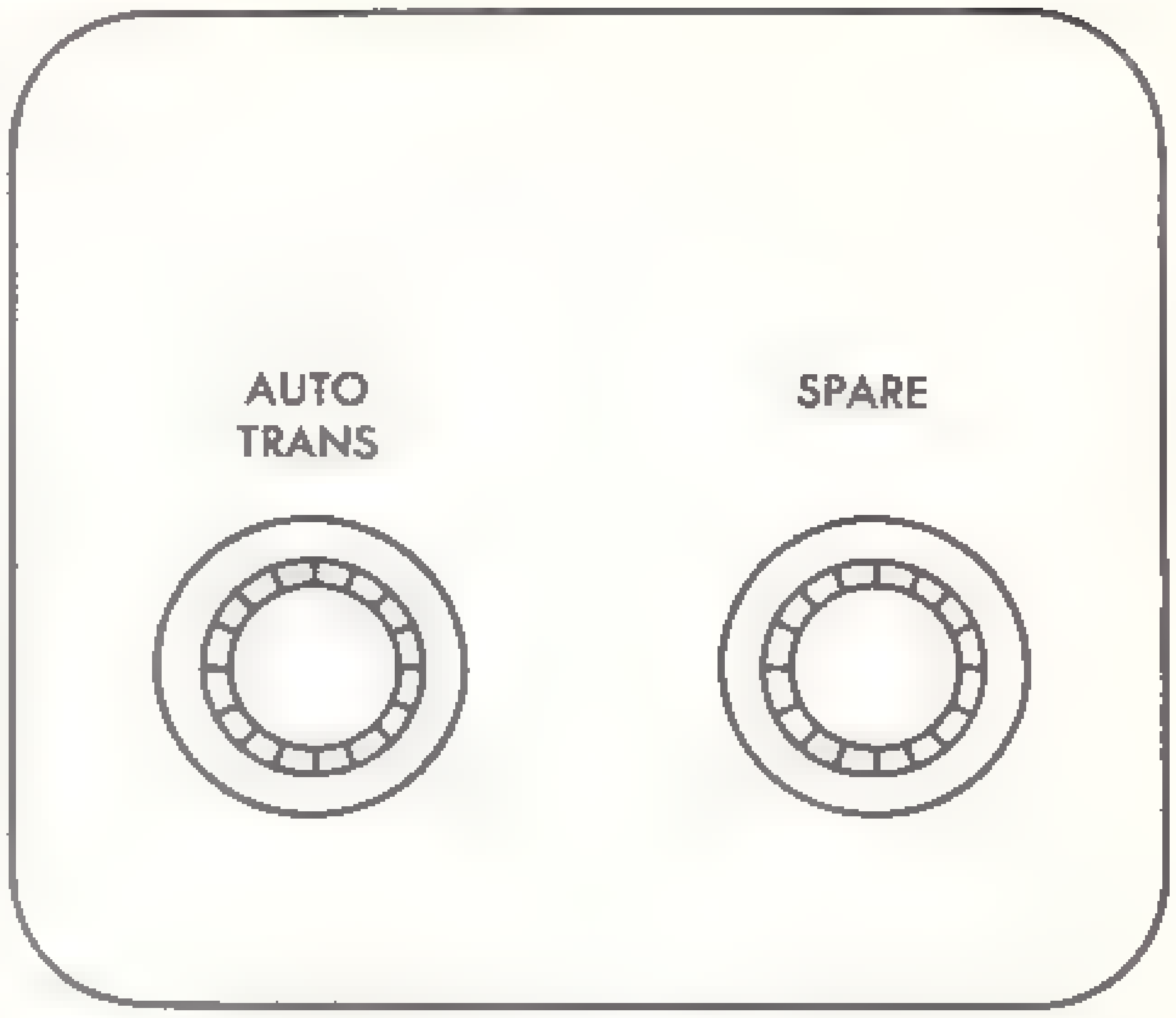


Figure 12–33. Transformer fuse panel (helicopters serial No. prior to 56-4313)

(4) On helicopter serial No. 56-4313 and subsequent, raise panel and shelf assembly in level position and secure. Install cover on fuse and circuit breaker panel.

(5) Connect battery.

12–144. AC Fuse (Dummy Load) (Helicopters Serial No. 57-1742 and Subsequent). The dummy load resistor ac power circuit is protected by a fuse, located on the fuse and circuit breaker panel (5, figure 12–7) above the battery compartment. The fuse is marked DUMMY LOAD and is installed in a fuse holder and secured with a cap.

a. Removal. Remove cap, fuse, and fuse holder from fuse and circuit breaker panel (5, figure 12–7) as follows:

(1) Place BATT switch in OFF position and GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Remove cover from fuse and circuit breaker panel (23, figure 12–2). Release catch on each side of panel and shelf assembly (27) and lower panel and shelf assembly.

(3) Press cap to fuse holder and turn counterclockwise. Relax pressure, and remove cap and fuse.

(4) Disconnect electrical wires from fuse holder.

(5) Remove nut, washer, and lockwasher securing fuse holder to fuse and circuit breaker panel. Remove fuse holder.

b. Inspection. (1) Inspect fuse for cracks, corrosion, breakage, blown condition, and loose components.

(2) Inspect cap and fuse holder for cracks, corrosion, distortion, and damage.

c. Installation. Install fuse holder, fuse, and cap on fuse and circuit breaker panel (5, figure 12–7) as follows:

(1) Position fuse holder on fuse and circuit breaker panel and secure with lockwashers, washers, and nut.

(2) Connect electrical wires to proper terminals on fuse holder.

Note

For correct electrical wire connection, refer to applicable wiring diagrams.

(3) Insert fuse in fuse holder and secure by pressing cap to fuse holder and turning clockwise until cap is locked in place.

(4) Raise panel and shelf assembly in level position and secure. Install cover on fuse and circuit breaker panel.

(5) Connect battery.

12–145. AC Circuit Breaker (Helicopters Serial No. 57-1742 and Subsequent). The MN-100A glide slope receiver ac power circuit is protected by a circuit breaker located on the radio fuse and circuit breaker panel (1, figure 12–1, or 2, figure 12–2). The circuit breaker is marked MN-100A-AC.

a. Removal. (1) Place BATT switch in OFF position and GEN switch in GEN OFF position. Disconnect battery and disconnect external power source from external power receptacle.

(2) Loosen fasteners and pull radio fuse and circuit breaker panel (1, figure 12–1, or 2, figure 12–2) from control console (24, figure 12–1, or 17, figure 12–2).

(3) Disconnect electrical wires from circuit breaker.

(4) Remove screws securing circuit breaker to radio fuse and circuit breaker panel. Remove circuit breaker.

b. Inspection. Inspect circuit breaker for corrosion, indication of overheating, arcing or burning, cracked or broken terminals, damage threads, and security or damage of push-pull button.

c. Installation. (1) Position circuit breaker on radio fuse and circuit breaker panel (1, figure 12–1, or 2, figure 12–2) and secure with screws.

(2) Connect electrical wire to proper terminals on circuit breaker.

Note

For correct electrical wire connection, refer to applicable wiring diagram.

(3) Position radio fuse and circuit breaker panel on control console (24, figure 12–1, or 17, figure 12–2) and secure with fasteners.

(4) Connect battery.

Section VII Inverter System

Not Applicable

Section VIII Wiring Diagrams

12–146. General. The information contained in this section is intended to enable maintenance personnel to understand the makeup and function of electrical and avionics circuits. Detailed wiring diagrams for electrical circuits and interconnecting wiring diagrams for avionics equipment are included. Each component of equipment shown is assigned an index number for identification purposes. Identical parts used elsewhere are assigned the same index number and differentiated by descriptive nomenclature where shown. Decal nomenclature found in the helicopter is used for identification where such decals appear. Decal switch positions are as shown in the helicopter and appear on the drawings adjacent to the corresponding switch contact or position.

12–147. Model Designation. Model designations shown on wiring diagrams reflect production wiring of CH-34A and CH-34C helicopters. The fact that paragraph 1–1 indicates different serial number effectivity versus Model No. has no bearing on individual helicopter wiring, unless otherwise shown on the diagrams.

12–148. Electrical Wiring. The electrical wiring conforms, in general, to Military Specification MIL-W-5088 and meets the requirements of Military Specifications MIL-W-76, MIL-W-5086, and MIL-C-7078. Stranded, tinned, copper bonding strips are used to ground flying controls and moving parts. Some fixed components are bonded where it is desirable to ensure

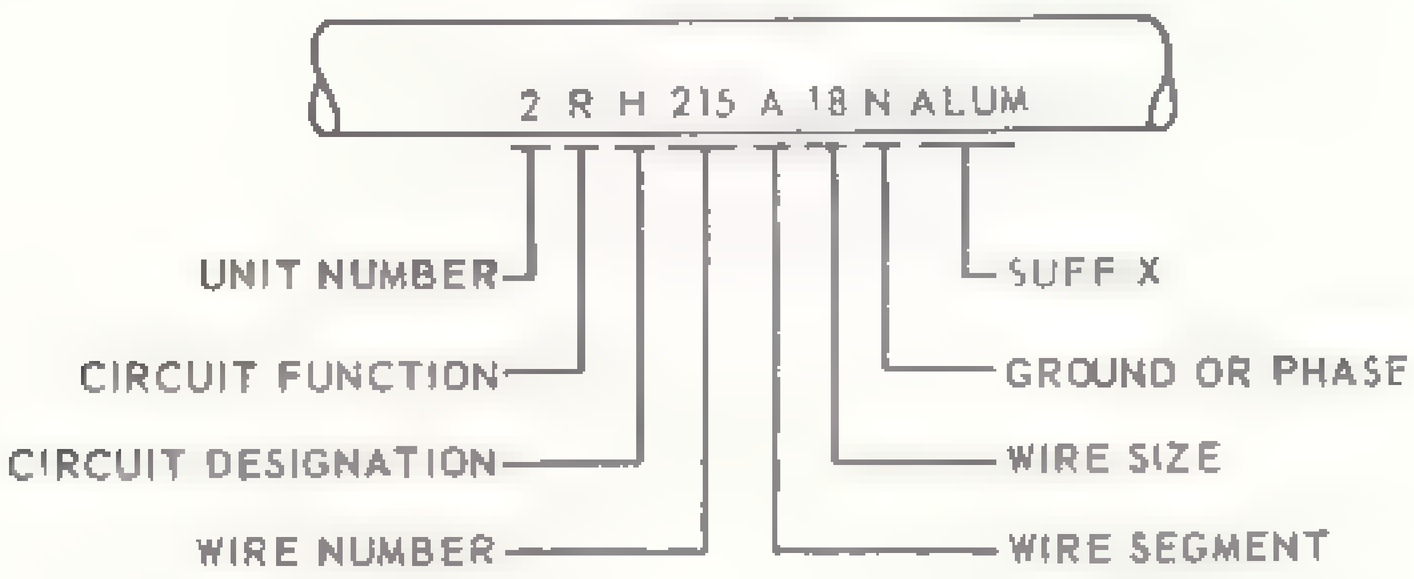
a good ground. A junction box is used for interconnection and breakdown of circuits contained in cable assemblies. Multipoint connectors or terminal lugs are used to connect cable assemblies to junction boxes and panel assemblies. The cables in all assemblies are identified to indicate the system served.

12–149. Wire Identification. Wiring used in the helicopter is identified by a code of numbers and letters stamped at intervals throughout the wire length. Wire identification code is broken down as follows: (See figure 12–34.)

a. The initial letter (or letters) designates the circuit of which the helicopter is a part.

b. The next number (or numbers) is the wire number which separates one section or leg of the circuit from all others.

WIRE IDENTIFICATION CODE



CIRCUIT FUNCTION LETTERS

C	Control Surfaces	RF	FM Radio
D	Instruments (other than flight and engine)	RH	Homing
E	Engine Circuits	RM	Marker Beacon
F	Flight Instruments	RN	Navigation
H	Heating and Ventilating	RU	UHF Command
J	Ignition	RV	VHF Command
K	Engine Controls	RZ	Interphone, Headsets
L	Lighting	W	Warning and Emergency
M	Miscellaneous	X	AC Power (see below)
N	Ground (used at end of wire number)	X – A	A Phase of Three-Phase Power
P	DC Power	X – C	C Phase of Three-Phase Power
Q	Fuel and Oil	X – CA	CA Phase of Three-Phase Power
R	Radio (see below)	X – N	Neutral or Ground
RC	Command	XP	Inverter DC Power or Control
RD	Radio Direction Finding	XW	Inverter Warning

Figure 12–34. Wire identification code

c. The following letter indicates segments of wire in a wire number where the wire passes through or branches at a connector or terminal strip.

d. The number (or numbers) following the segment designation is the standard AWG wire size.

e. If the wire is in the ground portion of a circuit, the suffix N is added to indicate a ground return.

f. Where a wire code is duplicated, the unit number 1 or 2 is prefixed to differentiate between the two circuits.

12–150. Terminal Strip Identification. All terminal strips containing more than one post are identified in the helicopter and on the detail wiring diagrams by a number within a triangle. This number appears on the diagram adjacent to each terminal strip or segment of terminal strip, and corresponds to a number on the terminal strip chart where the complete terminal strip, with associated wiring, is illustrated. Each terminal strip on the terminal strip chart is identified by the appropriate number within a triangle, and the location and identification of the strip is given. If any strip is shown more than once on the terminal strip chart, the applicability of each strip is given below the strip. All single-post terminal strips are identified on the circuit wiring diagram by an index number within a circle which corresponds to the item number in the equipment list.

12–151. Plug and Receptacle Identification. All plugs and receptacles that carry wires for only one circuit are shown complete on the applicable detail wiring diagrams. All plugs and receptacles that carry wires for more than one circuit are identified on the circuit wiring diagrams by a number within a diamond,

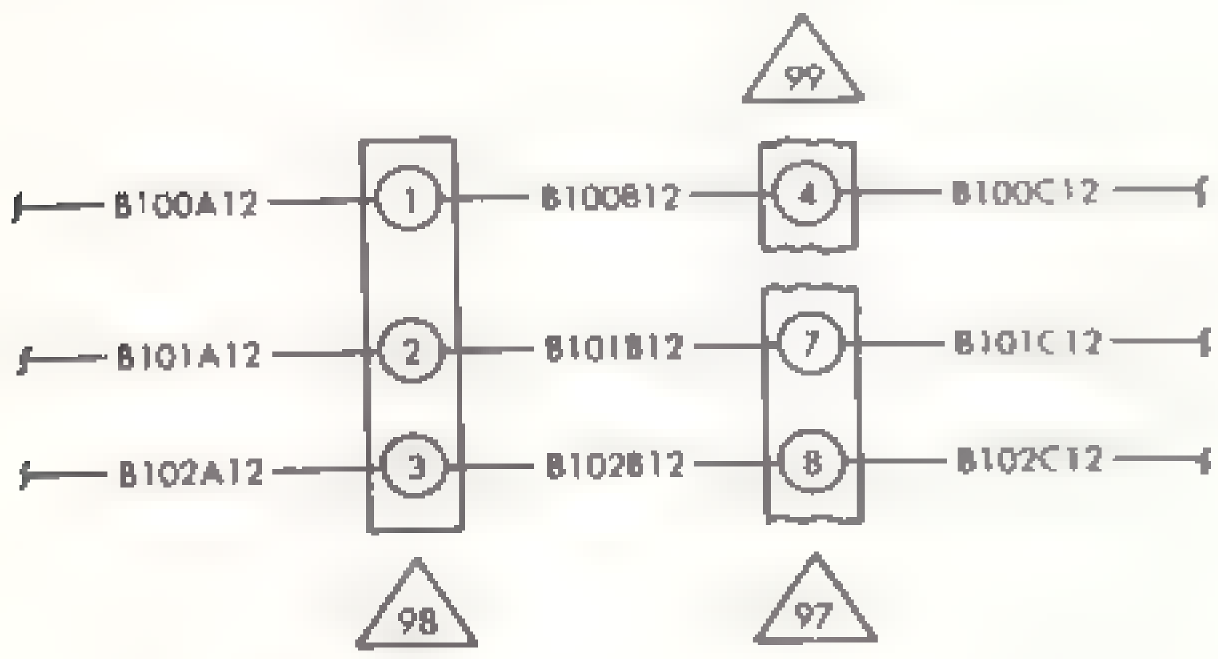


Figure 12–35. Terminal strip identification

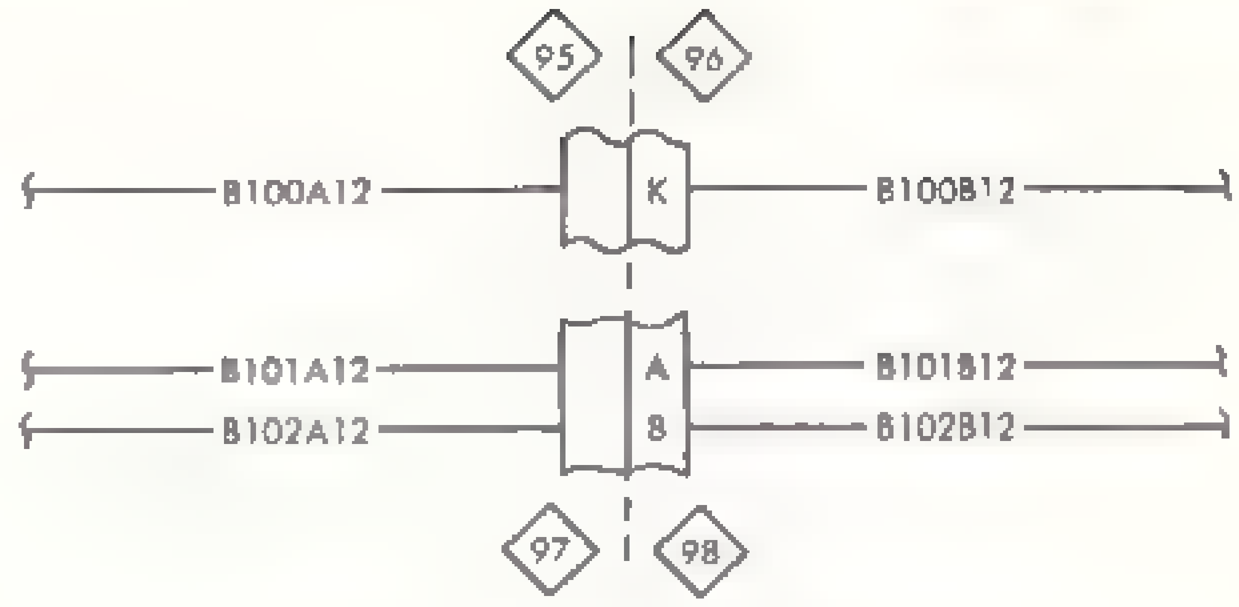


Figure 12–36. Plug and receptacle identification

and only the applicable segment or segments of the plug and receptacle is shown. This number corresponds to a number on the plug and receptacle chart where the complete plug and receptacle, with associated wiring, is illustrated. Each plug and receptacle on the plug and receptacle chart is identified by the appropriate number within a diamond, and the part No., location, and identification of the component is given. If any plug or receptacle is shown more than once on the plug and receptacle chart, the applicablility of each is given. Those plugs and receptacles that appear on the plug and receptacle chart are part of the wiring harness of the helicopter.

12–152. Electrical Symbols. The electrical symbols used in the wiring diagrams conform to Military Standard MIL-STD-15. Figure 12–37 illustrates and identifies symbols and combinations of symbols used in the wiring diagrams. Where appropriate symbols are not available, the component is shown as a rectangle and identified in the equipment list.

12–153. Equipment List. Table 12–5 contains a list of the electrical and avionics equipment shown in the wiring diagrams. The purpose of the equipment list is to enable the maintenance personnel to readily identify components of the helicopter shown in the wiring diagrams. Each piece of equipment shown in the wiring diagrams is identified with the same number assigned to the equipment list. Location of major equipment is shown on a suitable drawing of the helicopter on each wiring diagram.

Table 12–5. Equipment list (Sheet 1 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
1	Adapter			AN3057-12
2	Adapter, Angle	Aircraft Radio Corp		M359-A
3	Adapter, Angle	American Phenolic Corp		UG-27C/U
4	Adapter, Angle	American Phenolic Corp		UG-306/U

Table 12—5. Equipment list (Sheet 2 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
5	Adapter, Angle	American Phenolic Corp		UG-567/U
6	Alarm, Crew		J-3	80364
7	Ammeter		J-1	AN32529A
8	Amplifier, Electronic Control		A-2	21125A (MIL-A-6589)
9	Amplifier, Repeater	Sperry Gyroscope	B-7A	653822
10	Antenna			AT-450/ARC-45
11	Antenna		ARC-44	AT-454/ARC
12	Antenna			AT-454A/ARC
13	Antenna			MN92A
14	Antenna	Aircraft Radio Corp	A-15	16630
15	Antenna	Collins Radio Corp		37X-2
16	Antenna Coupler			CU-361/ARC
17	Antenna Element			AT-624/AR
18	Antenna Keyer			KY-149AR
19	Antenna, Loop	Aircraft Radio Corp	L-10A	16160
20	Antenna, Marker Beacon	Collins Radio Co	ARN-12	37X-1
21	Antenna Take-Up			MS25057-1
22	Antenna Take-Up			MS25058-1
23	Antenna, VHF	Aircraft Radio Corp	A-13B	AS-580/ARN-30
24	Autotransformer			S1655-61788
25	Autotransformer	General Electric Co	115/26 vac, 50 va, 1 phase	70G175
26	Battery		24 vdc, 36 amp hr	AN3150-2 or AN3151-2
27	Battery		24 vdc, 24 amp hr	AN3151-2
28	Blower	Dynamic Air Engineering		M4941A-1A
29	Blower, Rotor Brake	Joy Mfg Co		X702-162
30	Brake, Magnetic			S1640-61195
		Airborne Accessories Corp		R-460M3-2
		Lynden Aircraft		1041
		Airborne Accessories Corp		R-460M3-21
31	Bulb, Temperature			MS24482-1
32	Bulb, Temperature		G-1	MIL-B-7370
33	Bulb, Temperature			MS28034-1
34	Cable Assembly	Aircraft Radio Corp		17985
35	Cable Assembly, Fire Detection	Walter Kidde & Co		801950
36	Cable Assembly, Fire Detection	Walter Kidde & Co		801951
37	Cancellor, Control Stick	Lear Inc		911D
38	Capacitor			FB1015
39	Capacitor	Sprague Electric Co	250 uf	15785
40	Cartridge	Talco Engineering Co		1013-40
41	Circuit Breaker	Spencer Thermostat Co		D6755-1-1/2
42	Circuit Breaker		5 amp	MS25017-5
43	Circuit Breaker		5 amp	MS25005-5

Table 12–5. Equipment list (Sheet 3 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
44	Circuit Breaker		10 amp	MS25017-10
45	Circuit Breaker		10 amp	MS25017 or MP-703
46	Circuit Breaker		15 amp	MS25017-15
47	Circuit Breaker		20 amp	MS25017-20
48	Circuit Breaker		25 amp	MS25017-25
49	Circuit Breaker		35 amp	MS25017-35
50	Circuit Breaker		5 amp	MS25017-5
51	Circuit Breaker		50 amp	MS25017-50
52	Circuit Breaker			MS25244-3
53	Circuit Breaker	Talco Engineering Co		1016
54	Compass Unit, Radio			R-101A/ARN-6
55	Condenser		0.47 uf	CP10A1EB474K
56	Condenser	Cornell-Dubilier Electric Corp		FB-1030
57	Connector	Cannon Electric Co		DPA-32-33S
58	Connector	Cannon Electric Co		DPA-32-34P
59	Connector			K01-16-10SH
60	Connector			OC287209B-2
61	Connector			OC-2872048-2
62	Connector	American Phenolic Corp		UG-203/U
63	Connector	American Phenolic Corp		UG-363/U
64	Connector	Aircraft Radio Corp		14491
65	Connector	Aircraft Radio Corp		16115
66	Connector	Aircraft Radio Corp		16742
67	Connector (part of cable assembly)	Aircraft Radio Corp		19062
68	Connector Assembly	Bendix Aviation Corp		2Z3046.86
69	Connector Assembly	Bendix Aviation Corp		2Z3046.87
70	Connector Assembly	Bendix Aviation Corp		2Z3081.31
71	Control		K-4B	
72	Control, Altitude			2203G
73	Control Box			SLA-85C
74	Control, Fire Extinguisher Charge	Walter Kidde & Co		871315-04
75	Control, Directional		S-3B	MIL-C-6231
76	Control, Gyro and Amplifier	Lear Inc		126165.01
77	Control Panel		C-1254	C-1254/ARN-30
78	Control Panel		C-1514/A	
79	Control Panel			SB-327/ARC-44
80	Control Panel	Aircraft Radio Corp	C-48	16410
81	Control Panel	Aircraft Radio Corp	C-49	16640
82	Control Panel	Aircraft Radio Corp	C-56	17170
83	Control Panel	Aircraft Radio Corp	C-68	19250

Table 12–5. Equipment list (Sheet 4 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
84	Control Set			C-1827/ARC-55
85	Control Unit (Panel)			C-2275/ARN
86	Control Unit (Fuel)	Avien Corp		2222-015-29
87	Control Unit (Helicopters Serial No. Prior to 54-882)	Walter Kidde & Co		870729
88	Control Unit Alarm (Helicopters Serial No. 54-882 and Subsequent)	Walter Kidde & Co		870729-05
89	Control Unit, Fuel Level (Helicopters Serial No. Prior to 56-4313)	Avien Corp		2222-017-30
90	Control, Volume	Aircraft Radio Corp		8487
91	Converter, Signal Data		B-13	CV-265/ARN-30A
92	Coupling Unit			CU-65/ARN-6
93	Cyclic Stick Grip	Superior Magneto Corp	B-8A	21225-1 (Helicopters Serial No. 57-1685 through 57-1690 and 57-1726 through 57-1741) 21225-7 (Model CH-34C Serial No. 57-1742 and Subsequent)
94	Detector, Fuel	Avien Corp		305-02-2
95	Disconnect Plug			MS310614S-7P
96	Disconnect Plug			MS3106A14S-7S
97	Disconnect Plug			MS3106A18-22S
98	Disconnect Plug			MS3106A20-27P
99	Disconnect Plug			MS3106R10S-2S
100	Disconnect Plug			MS3106R10SL-3S
101	Disconnect Plug			MS3106R10SL-4S
102	Disconnect Plug			MS3106R12S-3S
103	Disconnect Plug			MS3106R14S-2S
104	Disconnect Plug			MS3106R14S-5P
105	Disconnect Plug			MS3106R14S-5S
106	Disconnect Plug			MS3106R14S-7P
107	Disconnect Plug			MS3106R14S-9S
108	Disconnect Plug			MS3106R16-11S
109	Disconnect Plug			MS3106R16S-1S
110	Disconnect Plug			MS3106R16S-4S
111	Disconnect Plug			MS3106R16S-8S
112	Disconnect Plug			MS3106R18-1S
113	Disconnect Plug			MS3106R18-4S
114	Disconnect Plug			MS3106R20-27P
115	Disconnect Plug			MS3106R20-29P
116	Disconnect Plug			MS3106R20-29S
117	Disconnect Plug			MS3106R22-14S

Table 12–5. Equipment list (Sheet 5 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
118	Disconnect Plug			MS3106R24-28P
119	Disconnect Plug			MS3106R24-5S
120	Disconnect Plug			MS3106R24-7S
121	Disconnect Plug			MS3108A14S-7P
122	Disconnect Plug			MS3108A18-8P
123	Disconnect Plug			MS3108R10SL-3S
124	Disconnect Plug			MS3108R10SL-4S
125	Disconnect Plug			MS3108R12S-4S
126	Disconnect Plug			MS3108R14S-5S
127	Disconnect Plug			MS3108R18-4S
128	Disconnect Plug			MS3108R18-9S
129	Disconnect Plug			MS3108R24-7S
130	Disconnect Plug			AN3115-1
131	Disconnect Plug			DPA22000-14
132	Disconnect Plug	Cannon Electric Co		DPD-32-33S-2
133	Disconnect Plug			FW06-10S2S
134	Disconnect Plug			I.P.C. 14625
135	Disconnect Plug			K01-16-10RN
136	Disconnect Plug			MM-5-11-5/16
137	Disconnect Plug			MS25183-14S-5S
138	Disconnect Plug			MS3106A10SL-4S
139	Disconnect Plug			MS3106A16S-8S
140	Disconnect Plug			MS3106R10S-3S
141	Disconnect Plug			MS3106R10SL-3S
142	Disconnect Plug			MS3106R12S-4S
143	Disconnect Plug			MS3106R14S-2S
144	Disconnect Plug			MS3106R14S-5P
145	Disconnect Plug			MS3106R14S-6S
146	Disconnect Plug			MS3106R14S-7P
147	Disconnect Plug			MS3106R14S-7S
148	Disconnect Plug			MS3106R16S-4S
149	Disconnect Plug			MS3106R16S-8S
150	Disconnect Plug			MS3106R16-11S
151	Disconnect Plug			MS3106R18-1S
152	Disconnect Plug			MS3106R20-27S
153	Disconnect Plug			MS3106R20-27S (Alternate MS3106E20-27S)
154	Disconnect Plug			MS3106R20-29S
155	Disconnect Plug			MS3106R22-14P
156	Disconnect Plug			MS3106R24-14P
157	Disconnect Plug			MS3108A14S-2S
158	Disconnect Plug			MS3108A14S-7P

Table 12–5. Equipment list (Sheet 6 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
159	Disconnect Plug			MS3108A16S-5P
160	Disconnect Plug			MS3108R10SL-3S
161	Disconnect Plug			MS3108R12S-3S
162	Disconnect Plug			MS3108R12S-3S (Alternate MS3108E12S-3S)
163	Disconnect Plug			MS3108R14S-2P
164	Disconnect Plug			MS3108R14S-2S
165	Disconnect Plug			MS3108R14S-5S
166	Disconnect Plug			MS3108R14S-7S
167	Disconnect Plug			MS3108R8S-1S
168	Disconnect Plug	US Components Inc		M1-34FL
169	Disconnect Plug	Bendix Aviation Corp		PC06E-16-23S
170	Disconnect Plug			PL-259A
171	Disconnect Plug			U-77/U
172	Disconnect Plug	Cannon Electric Co		UD-6-11
173	Disconnect Plug	American Phenolic Corp		UG-88/U
174	Disconnect Plug	American Phenolic Corp		UG-21B/U
175	Disconnect Plug	American Phenolic Corp		UG-22C/U
176	Disconnect Plug	American Phenolic Corp		UG-536/U
177	Disconnect Plug	American Phenolic Corp		UG-573/U
178	Disconnect Plug	American Phenolic Corp		UG-709/U
179	Disconnect Plug	American Phenolic Corp		UG-913/U
180	Disconnect Plug	Dage Electric Co		1-902-1
181	Disconnect Plug	Dage Electric Co		1-903-1
182	Disconnect Plug	Dage Electric Co		1-907-1
183	Disconnect Plug	Dage Electric Co		1-908-1
184	Disconnect Plug	Bendix Aviation Corp		10-42664-2S
185	Disconnect Plug	Aircraft Radio Corp		14050
186	Disconnect Plug	Aircraft Radio Corp		14051
187	Disconnect Plug	Aircraft Radio Corp		14052
188	Disconnect Plug	Aircraft Radio Corp		14121
189	Disconnect Plug	Aircraft Radio Corp		14320
190	Disconnect Plug	Aircraft Radio Corp		15912
191	Disconnect Plug	Aircraft Radio Corp		16104
192	Disconnect Plug	Aircraft Radio Corp		16115
193	Disconnect Plug	Avien Corp		163-0511-1
194	Disconnect Plug	Avien Corp		163-0512-3
195	Disconnect Plug	Avien Corp		163-0513-3
196	Disconnect Plug	Avien Corp		163-0514-3
197	Disconnect Plug	Cannon Electric Co		270-8
198	Disconnect Plug			54A3A225-10SL-3S
199	Disconnect Plug			54A3A225-18-11S

Table 12–5. Equipment list (Sheet 7 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
200	Dust Cap	Cannon Electric Co		2209-8S
201	Dynamotor			DY-107/AR
202	Dynamotor			DY-150/ARN
203	Dynamotor		D-10A	DY-86/ARN-30
204	End Bell Adapter	Cannon Electric Co		K06-21-5/8
205	Feed-Thru			OC287209
206	Feed-Thru			S1655-61139-1
207	Feed-Thru			UG-492A/U
208	Feed-Thru	Dage Electric Co		1-889-1
209	Feed-Thru	Dage Electric Co		1-890-1
210	Feed-Thru (Lo-Z)	Dage Electric Co		1-891-1
211	Feed-Thru	Dage Electric Co		1-892
212	Feed-Thru	Avien Corp		163-0531
213	Feed-Thru	Avien Corp		163-0532
214	Feed-Thru	Avien Corp		163-0533
215	Feed-Thru	Avien Corp		163-0534
216	Filter			AN6101-1
217	Filter	Bendix-Scintilla Magneto Div. Bendix Aviation Corp		10-55085-2
218	Filter, Radio Interference	Sprague Electric Co		10JX52
219	Flasher, Position Light	J. Pollack Corp Seaboard Electric Co	C2	A100G 3295
220	FM Receiver-Transmitter			RT294/ARC-44
221	Fuse	Littelfuse, Inc.	1 amp	413001
222	Fuse	Littelfuse, Inc.	3 amp	413003
223	Generator		30-volt, 200 amp	AN3632-1A
224	Generator, Motor			R800-10
225	Gyro, Attitude Indicator		J-8	MIL-I-5133
226	Headset and Microphone	Duke Mfg Co		H-101/A
227	Headset and Microphone	Duke Mfg Co		H-46A/UR
228	Hoist, Winch	Breeze Corp, Inc		BTD-263-20
229	Hook, Cargo (Helicopters Serial No. Prior to 54-937)	Manning, Maxwell, & Moore		M2251 (S1650-62167-1)
	Hook, Cargo (Helicopters Serial No. 54-2860 to 55-4484)	Manning, Maxwell, & Moore		M3988 (S1650-62167-2)
	Hook, Cargo (Helicopters Serial No. 55-4485 through 55-4504)	Manning, Maxwell, & Moore		M3988 Modified (S1650-62167-3)
230	Hook, Cargo	Manning, Maxwell, & Moore Eastern Rotorcraft Corp		4147 (S1650-62194) SP4070 (S1650-62194)
231	Ignition Unit	Surface Combustion Corp		11C30
232	Impedance Matching Network			CU-435/AIC
233	Impedance Matching Network			CU-459/AR
234	Indicator			ID-48/ARN
235	Indicator, Course		IN-10	ID-453/ARN-30

Table 12–5. Equipment list (Sheet 8 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
236	Indicator, Azimuth	Aircraft Radio Corp		ID-637/ARN-59
237	Indicator, Course			ID-91/ARN-6
238	Indicator, Directional Gyroscopic		V-7A	MIL-I-5126
239	Indicator, Dual Tachometer	General Electric Co		8DJ67FAB1
240	Indicator, Fuel Pressure			MS28010-1
241	Indicator, Fuel Quantity	Avien Corp		162-0251-873
242	Indicator, Hydraulic Pressure			MS28010-5
243	Indicator, Oil Pressure			MS28010-3
244	Indicator, Temperature			MS28004-1
245	Indicator, Temperature			MS28008-1
246	Indicator, Temperature			MS28009-1
247	Indicator, Turn-and-Slip			MS28024-3
248	Indicator, Vertical Gyro		B-1A	
249	Insulator, Feed-Thru			126-LTI-600
250	Insulator, Strain			MS25052-1A
251	Insulator, Strain			126-S1-600(IL-7/U)
252	Inverter		115 vac, 250 va, 3/1 phase	MS25093-1
253	Inverter		750 va, 3/1 phase	MS17406-2B
254	Jack, Phone	Moulded Fabrication Co		U-61/U
255	Jack, Phone	Moulded Fabrication Co		U-82/U
256	Jack, Phone	Radio Corp of America		U-92/U
257	Jack, Phone	Radio Corp of America		U-94/U
258	Junction Box, Radio			S14-60-2341
259	Junction Box, Radio			S14-60-2341-3
260	Junction Shell	Cannon Electric Co		DPA-CG21-32 (20746)
261	Light	Grimes Mfg Co		D6810A
262	Light, Cockpit		C-4A	MIL-L-6484
263	Light Assembly		20 watt	B3545
264	Light Assembly (No. 1495 Lamps)			A-6100-C
265	Light Assembly (AN3121-313 Lamp)			AN3030-9A
266	Light Assembly (AN3121-313 Lamp)			AN3030-9A
267	Light Assembly (AN3121-313 Lamp)			AN3030-9A
268	Light Assembly (AN3121-313 Lamp)			AN3034-2
269	Light Assembly Navigational (AN3121-313 Lamp)			AN3092-3
270	Light Assembly (AN3121-313 Lamp)			MS25331-6
271	Light Assembly (AN3121-313 Lamp)			MS25331-8

Table 12–5. Equipment list (Sheet 9 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
272	Light Assembly (AN3122-1524 Lamp)			AN3033-9
273	Light Assembly (AN3122-1545 Lamp)			AN3033-9
274	Light Assembly (AN3124-307 Lamp)			MS25219-1
275	Light Assembly (AN3124-307 Lamp)			MS25219-1
276	Light Assembly (AN3140-327 Lamp)			MS25041-6
277	Light Assembly (AN3140-327 Lamp)			MS25041-8
278	Light, Cargo Flood			MS25243-4502
279	Light, Dome			MS25358-1
280	Light, Instrument		28 vdc, 0.04 amp	MS25237-327
281	Light, Landing	Grimes Mfg Co	450 watt, 28 vdc	G6250-1
282	Light, Panel	General Electric Co		334
283	Light (Part of AN5766-T4)		28 vdc, 0.04 amp	MS 25237-327
284	Light, Rotating	Grimes Mfg Co		G7740A-24 (Alternate G7740-24)
285	Loop			AT-780/ARN
286	Loop Assembly			AS-313A/ARN-6
287	Magneto			(Furnished with engine)
288	Motor Box Assembly			S1645-61145
289	Mounting		M-11A	ARC 12501
290	Mounting		M-12A	ARC 12502
291	Mounting		M-10	MT-1174/ARN-30A
292	Mounting		DY-107	MT-1267/AR
293	Mounting		ARC-44	MT-1268/AR
294	Mounting			MT-274/ARN-6
295	Panel, ASE Control	Lear Inc		105356-02
296	Panel, Motor Box			S1645-61120
297	Pin Plug	Walter Kidde & Co		40648
298	Plug			S1655-61042
299	Plug, Battery	Cannon Electric Co		11751-1
300	Plug, Connector	Dage Electric Co		1-317-1
301	Plug, Connector	Dage Electric Co		1-906-1
302	Plug, Wired	Aircraft Radio Corp		11934
303	Pump	Lear Inc		RG-6100-H
304	Pump, Clutch	Lear Inc		RG-6100-G
305	Pump, Fuel Booster	Thompson Products, Inc		TF51300-11
306	Pump, Fuel Transfer	Lear Inc		RG-11250

Table 12—5. Equipment list (Sheet 10 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
307	Pump, Heater Fuel	Weldon Tool Co	3008A	3008A
308	Rack		E-14	MT-1175/ARN-30
309	Receiver			MN-100-A
310	Receiver			R-122/ARN-12
311	Receiver		R-13B	R-445/ARN-30A
312	Receiver		R-19	R-508/ARC
313	Receiver	Aircraft Radio Corp	R-15	R-509/ARC
314	Receiver		R-11A	R-511/ARC
315	Receiver			R-666A/ARN-32
316	Receiver, Radio			R-836/ARN
317	Receiver-Transmitter			RT-349/ARC-55B
318	Receptacle			2552-3A
319	Receptacle			MS3100A14S-7P
320	Receptacle			MS3100E14S-7P
321	Receptacle			MS3100E14S-7S
322	Receptacle			MS3100E20-29S
323	Receptacle			MS3101A22-14P
324	Receptacle			MS3101A28-15S
325	Receptacle			MS3101E14S-6S
326	Receptacle			MS3102A18-18S
327	Receptacle			MS3102E20-7S
328	Receptacle	Cannon Electric Co		FW00-14S-7S
329	Receptacle	Cannon Electric Co		FW00-20-27P
330	Receptacle	Cannon Electric Co		FW00-20-27S
331	Receptacle	Cannon Electric Co		FW00-22-14P
332	Receptacle	Cannon Electric Co		FW00-28-8S
333	Receptacle	Winchester Electronics		MRE-34S-6
334	Receptacle			MS3100E14S-7P
335	Receptacle			MS3100E14S-7S
336	Receptacle			MS3101E22-14S
337	Receptacle			MS3102E20-7S
338	Receptacle			U-77/U
339	Receptacle			U-79/U
340	Receptacle	Cannon Electric Co		11749-1
341	Receptacle	Walter Kidde & Co		840649
342	Receptacle	American Phenolic Corp		97-5107-18-22P
343	Regulator, Voltage	Leech Neville Co		E1597
344	Regulator, Voltage	Leech Neville Co		E1597-1 (With AF49C7573A Base)
345	Relay			MS24149D1
346	Relay			MS24149D1
347	Relay		10 amp, 1 PDT-	AN3314-1
348	Relay		25 amp 1 PST	AN3320-1

Table 12–5. Equipment list (Sheet 11 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
349	Relay, Armature		25 amp 1 PDT	AN3324-1
350	Relay, Solenoid			MS24166D1
351	Relay			MS24171D1
352	Relay			MS24172D1
353	Relay			MS24568D1
354	Relay			MS25024-1 or MS25024-2
355	Relay		M-2	32603A
356	Relay	Cook Electric Co		636-172
357	Relay	Cook Electric Co		650-4034
358	Relay, Emergency Release	Magnacraft Elec Co		33HSX-30
359	Relay, Fire Detector Armature	Walter Kidde & Co		840505
360	Relay, Oscillator	Aircraft Radio Corp	K-13	16770
361	Relay, Overvoltage		E-2	MIL-R-6467
362	Relay, Reverse Current Cut-Out			AN3025-300
363	Relay, Thermal Hold-Over			TF-OG-N0115
364	Relay, Time Delay	G.V. Controls		HF01-N0-28
365	Relay, Warning Light Dimming	C.P. Clare	Type J 6PDT	860448
366	Resistor		120 ohm	MS35033-9
367	Resistor		150 ohm	MS35043-67
368	Resistor		1000 ohm	MS35044-101
369	Resistor		120 ohm	MS35044-218
370	Resistor		6.8 Megohm	MS90194-141
371	Resistor		120 ohm	MS90194-167
372	Resistor		220 ohm	MS90194-170
373	Resistor		680 ohm	MS90194-176
374	Resistor		1200 ohm	MS90194-179
375	Resistor		1800 ohm	MS90194-181
376	Resistor		6800 ohm	MS90194-188
377	Resistor		120 ohm	MS90194-27
378	Resistor		150 ohm	MS90194-29
379	Resistor		220 ohm	MS90194-33
380	Resistor		470 ohm	MS90194-41
381	Resistor		680 ohm	MS90194-45
382	Resistor		5600 ohm	MS90194-67
383	Resistor		6800 ohm	MS90194-69
384	Resistor		150 ohm	RC20BE151K
385	Resistor		680 ohm	RC20BE681K
386	Resistor	Allen Bradley Co	6800 ohm	RC20BE682K
387	Resistor	Allen Bradley Co	47 ohm	RC20BE47K
388	Resistor		150 ohm	RC21BE151J
389	Resistor		51 ohm 2 w	MS35045-56
390	Terminal Block			MS25123-1-1
391	Resistor	International Resistance Co	1000 ohm	RW20G102

Table 12–5. Equipment list (Sheet 14 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
462	Tank Unit, Center Tank Center Cell (Helicopters Serial No. 53-4475 through 53-4529)	Avien Corp		165-0460-1502A (S1630-62406)
	Tank Unit, Center Tank Center Cell (Helicopters Serial No. 53-4530 and Subsequent)	Avien Corp		165-0460-1502A (S1630-62406-1)
463	Tank Unit, Aft Tank Center Cell (Helicopters Serial No. 53-4475 through 53-4529)	Avien Corp		165-0461-1443 (S1630-62407)
	Tank Unit, Aft Tank Center Cell (Helicopters Serial No. 53-4530 through 55-4504)	Avien Corp		165-0461-1443A (S1630-62407-1)
	Tank Unit, Aft Tank Center Cell (Helicopters Serial No. 56-4284 and Subsequent)	Avien Corp		165-0461-1443B (S1630-62407-2)
464	Tee			MS25053-1
465	Tee, Hi-Z	Dage Electric Co		1-332-1
466	Tee, Hi-Z	Avien Corp		163-0551
467	Tee, Low-Z	Dage Electric Co		1-333-1
468	Tee, Low-Z	Avien Corp		163-0552
469	Tee Splice			126-TS-600-(U-67/U)
470	Tension Unit	Fredric Flader, Inc		126ATU-600 (MX1257/A)
471	Tension Unit	Fredric Flader, Inc		126TTU-600 (MX78VA)
472	Terminal Block			MS25123-2-1
473	Terminal Block			MS25123-2-2
474	Terminal Block			MS25123-8-1
475	Terminal Block			S1655-61138-2
476	Transducer	Colvin Laboratories		222-PB-3-15S
477	Transmitter, Fuel Pressure			MS28005-1
478	Transmitter, Oil Pressure			MS28005-3
479	Transmitter, Pressure			MS28005-5
480	Transmitter, Radio		T-13A	T-363/ARC
481	Transmitter, Radio		T-11B	T-366/ARC
482	Transmitter, Remote Compass	Lear Inc	C2	27635
483	Tube, Pitot			AN5813-1
484	Valve	Marotto Engineering Co		208374
485	Valve, Diverter	General Controls Co		AV16B1354C
486	Valve, Engine Primer Solenoid			(Furnished with engine)
487	Valve, Fuel Shutoff	Surface Combustion Corp General Controls Co		09C27 AV-1B-1501
488	Valve, Autopilot	Adel Division, General Metals Corp Aircraft Products		25036 (S1565-61831) 640-30-1 (S1565-61831)
489	Vibrator, Inductor			AN4181-1
490	Voltmeter		0-30 volts	AN3203V30

Table 12–5. Equipment list (Sheet 15 of 15)

ITEM NO.	NOMENCLATURE	MANUFACTURER	TYPE	PART NO. OR SPECIFICATION
491	Windshield Wiper Motor	Alco Valve Co		XW20173-1
492	Connector			UG-260/U
493	Light (Part of Light Shields)		28 vdc, 0.04 amp	MS25237-327
494	Light (Part of MS25010-4)		28 vdc, 0.04 amp	MS25237-327
495	Resistor		110 watt, 180 ohm	RW38G181
496	Switch Box, Interphone			S14-05-6102
497	Antenna			AT-884/APX-44
498	Control Panel			C-2714/APX-44
499	Circuit Breaker		10 amp	MS25244-10
500	Disconnect Plug	American Phenolic Corp		UG-573A/U
501	Receiver-Transmitter			RT-494/APX-44
502	Disconnect Plug	Cannon Electric Co		PTO6E-22-55S
503	Disconnect Plug			2Z3081-91
504	Circuit Breaker		10 amp	MS25244-10
505	Disconnect Plug	Cannon Electric Co		PTO6A-(SR)-18-32S
506	Cyclic Stick Grip, Pilot's			TYPE B-8A
507	Disconnect Plug			MS3106E-20-29P
508	Permanent Splice			320559
509	Disconnect Plug			DD-50S-C7
510	Control Panel			6140-6
511	Disconnect Plug			DPA-29C1-33S-2
512	Receiver			51X-2B
513	Disconnect Plug			DPA-24C2-33S-2
514	Disconnect Plug			DPA-24HV2-33S-2
515	Transmitter			17L-7A
516	Antenna			37R-2
517	Pump, Fuel Booster	Lear Inc		RG-11260A3
518	Fuel Detector	Avien Corp		305-02-2
519	Circuit Breaker		20 amp	MS25005-20
520	Pump, Clutch	Lear Inc		RG-6100-6-1
521	Disconnect Plug			54A3A-225-16S-59
522	Cargo Hook			SP4070-3
523	Chip Detector Plug			CD48A

Figure 12–37. Electrical symbols chart (Sheet 2 of 3)

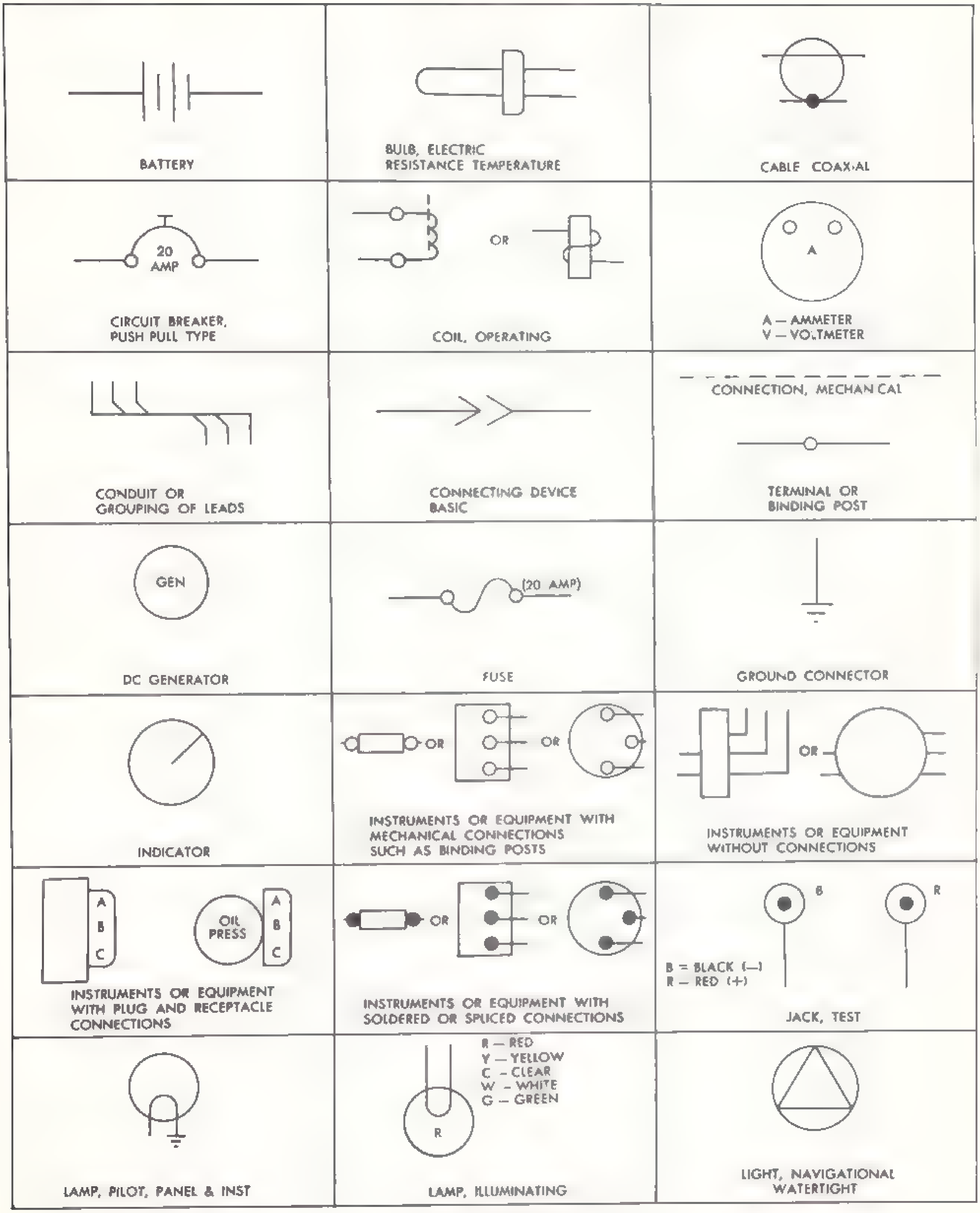
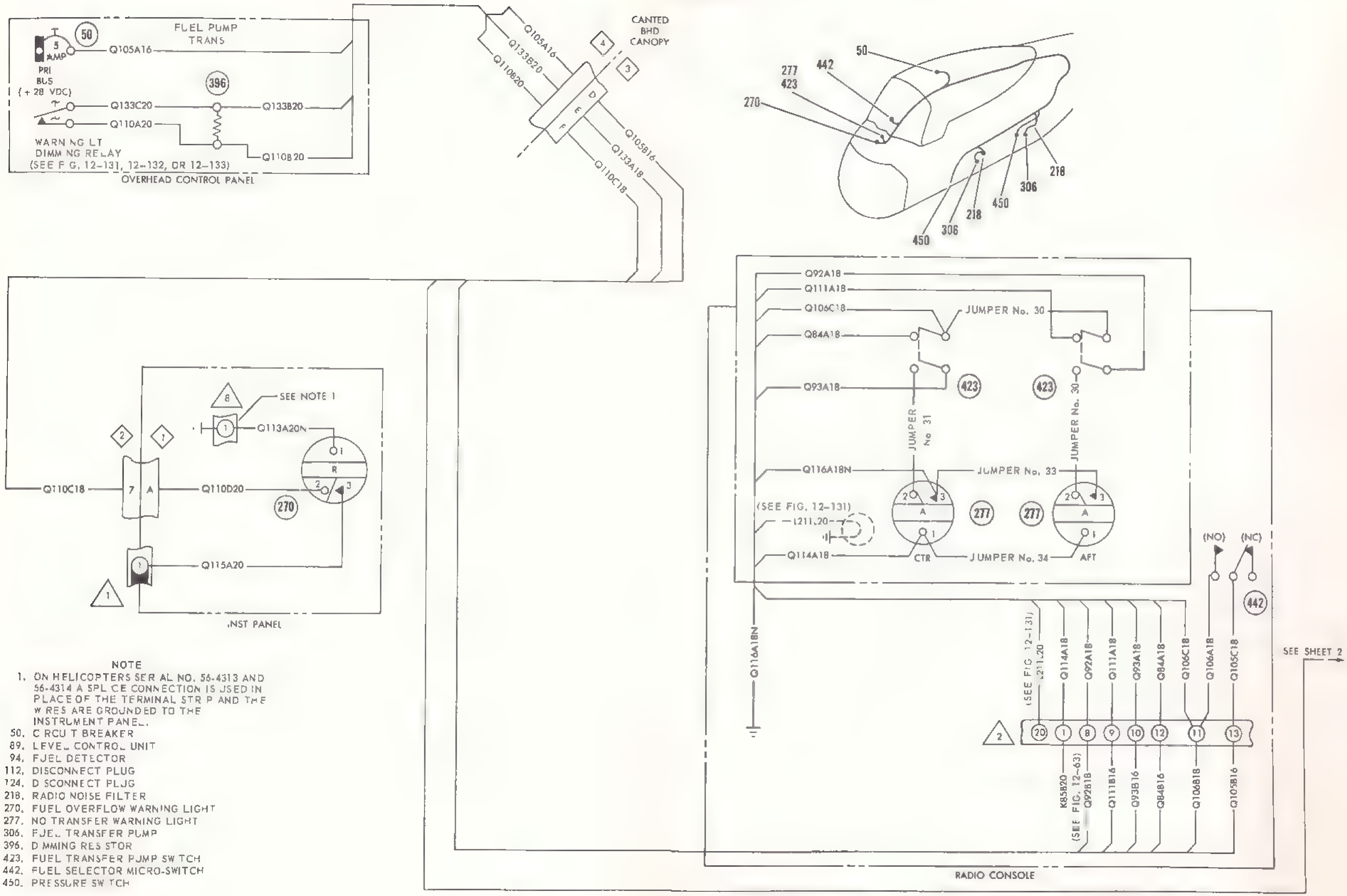


Figure 12–37. Electrical symbols chart (Sheet 1 of 3)



NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

50. CIRCUIT BREAKER
89. LEVEL CONTROL UNIT
94. FUEL DETECTOR
112. DISCONNECT PLUG
124. DISCONNECT PLUG
218. RADIO NOISE FILTER
270. FUEL OVERFLOW WARNING LIGHT
277. NO TRANSFER WARNING LIGHT
306. FUEL TRANSFER PUMP
396. DIMMING RESISTOR
423. FUEL TRANSFER PUMP SWITCH
442. FUEL SELECTOR MICRO-SWITCH
450. PRESSURE SWITCH

Figure 12–50. Fuel transfer pumps, low pressure switch and fuel overflow safety switch (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C serial No. 57-1742 and subsequent) (Sheet 1 of 2)

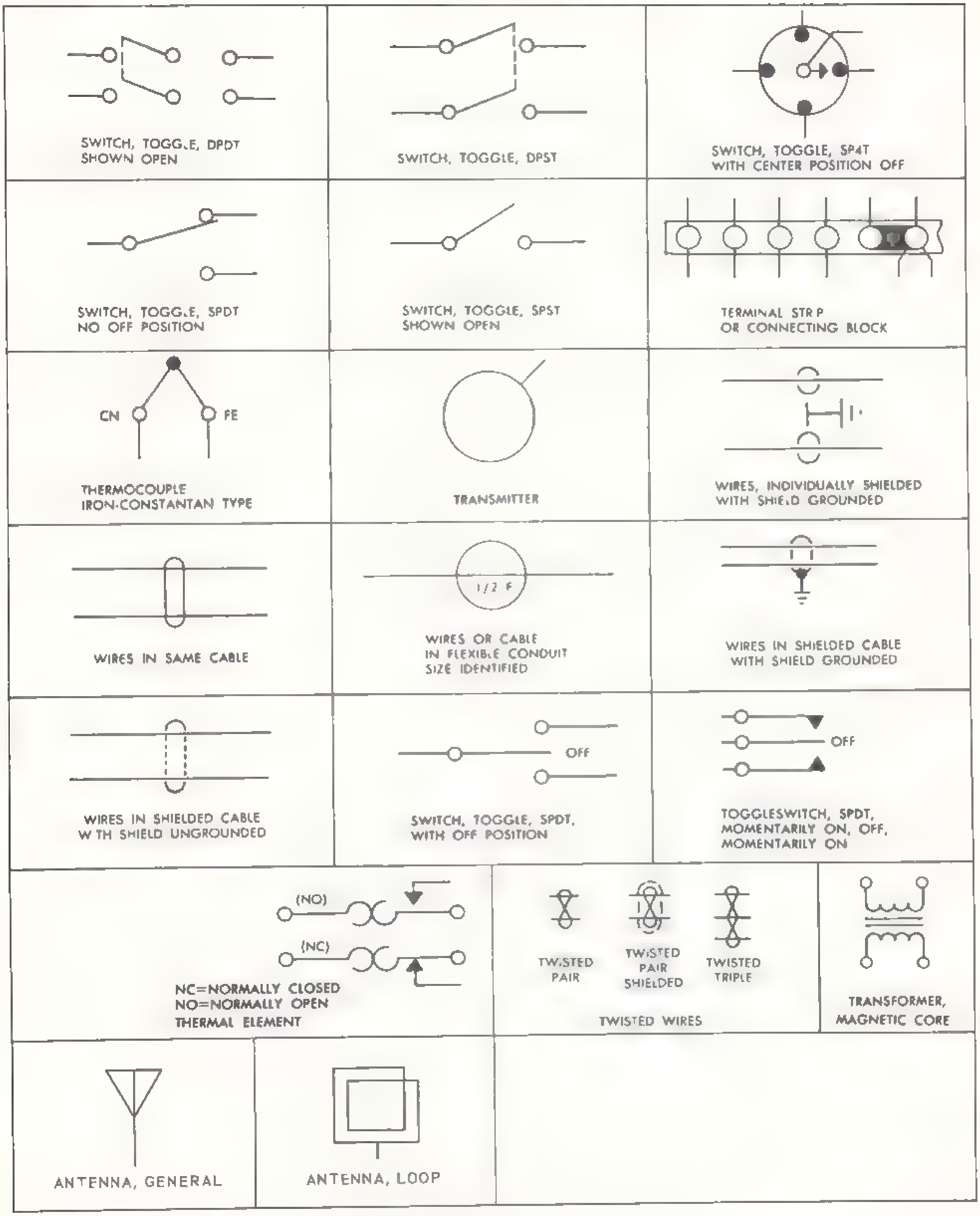


Figure 12–37. Electrical symbols chart (Sheet 3 of 3)

12—154. Index of Wiring Diagrams. The following list contains an alphabetical listing of wiring diagram titles.

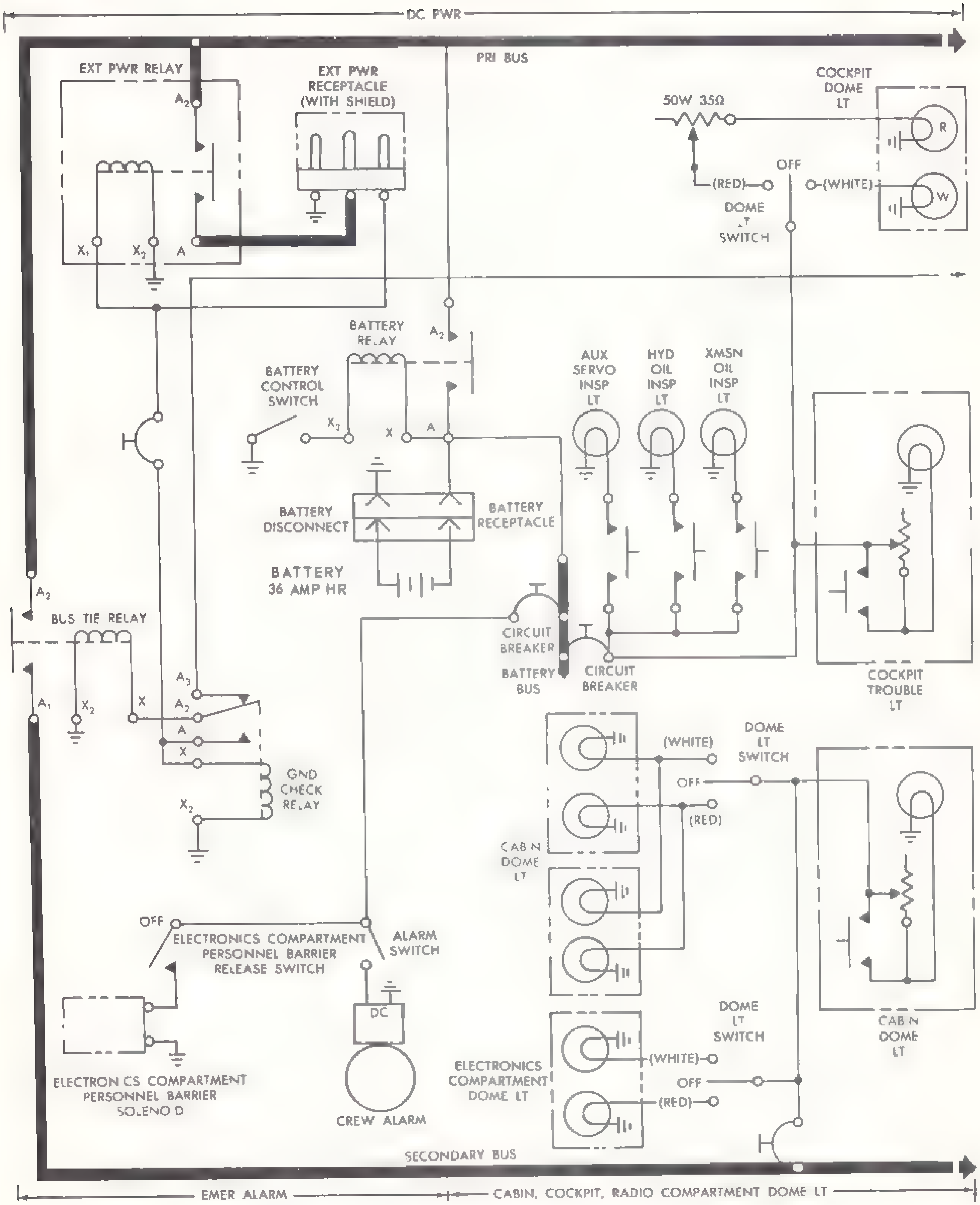


Figure 12—38. DC electrical schematic (Sheet 1 of 9)

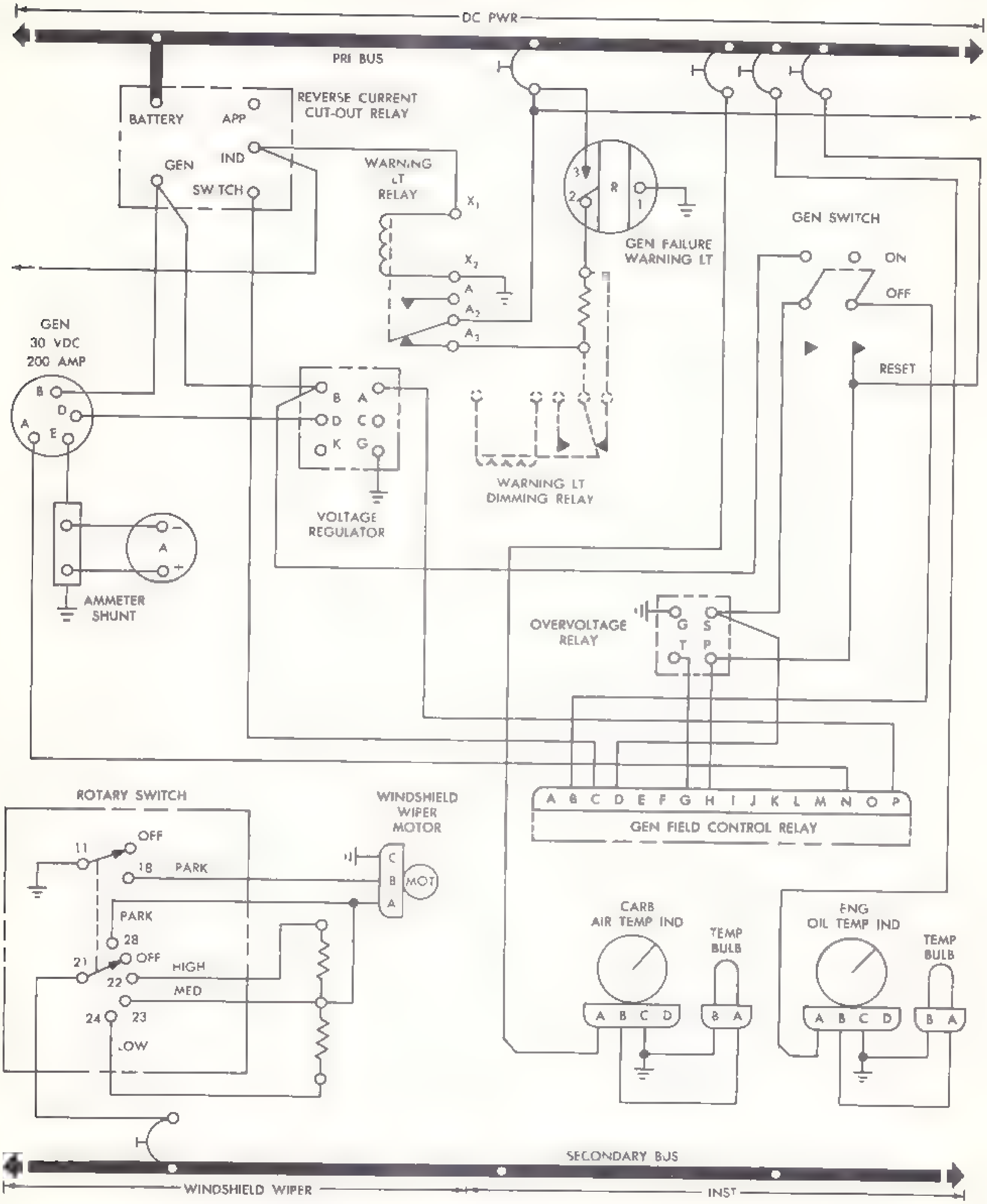


Figure 12–38. DC electrical schematic (Sheet 2 of 9)

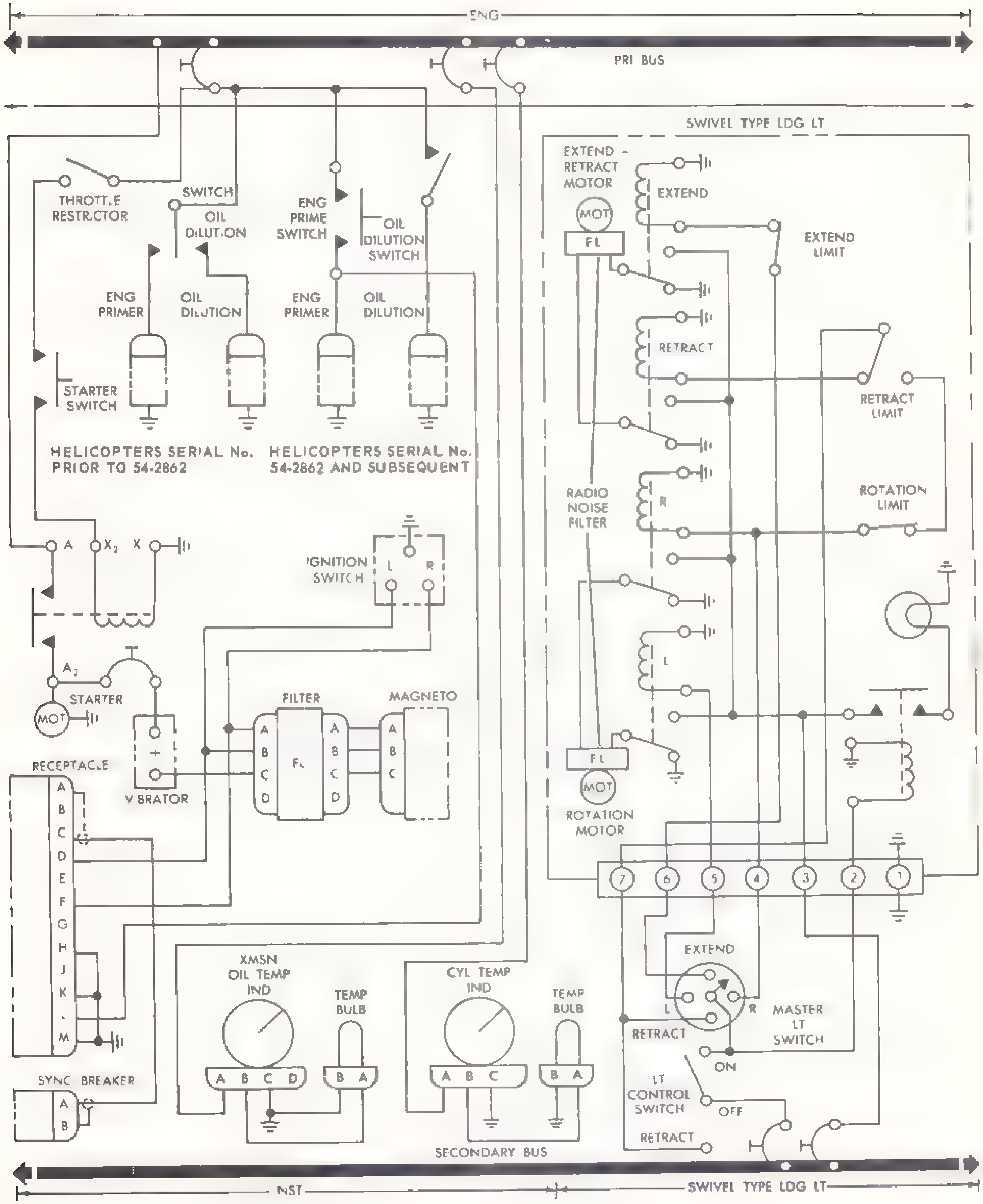
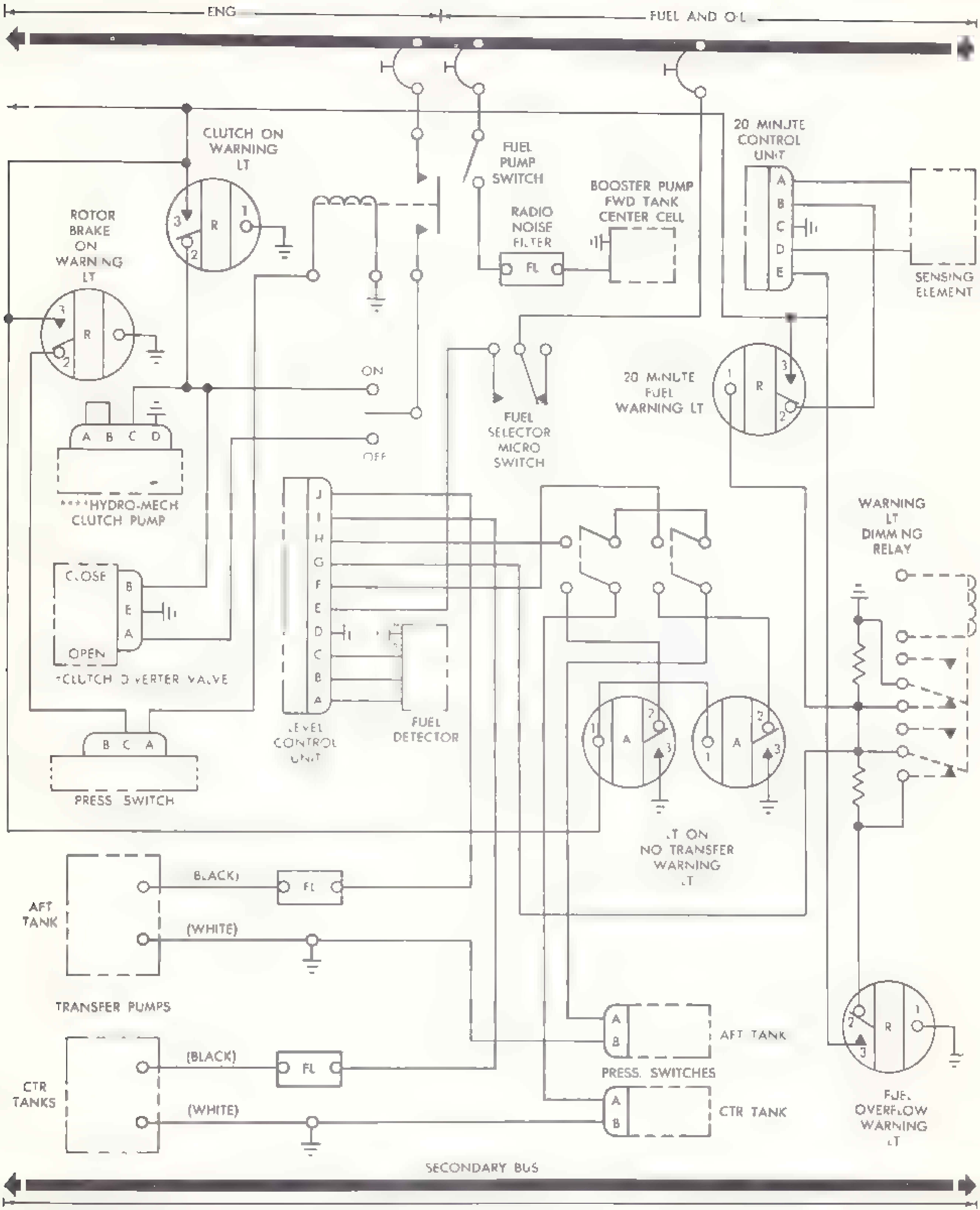


Figure 12—38. DC electrical schematic (Sheet 3 of 9)



****HELICOPTERS SERIAL No. PRIOR TO 56-4313
†HELICOPTERS SERIAL No. 56-4313 AND SUBSEQUENT

Figure 12–38. DC electrical schematic (Sheet 4 of 9)

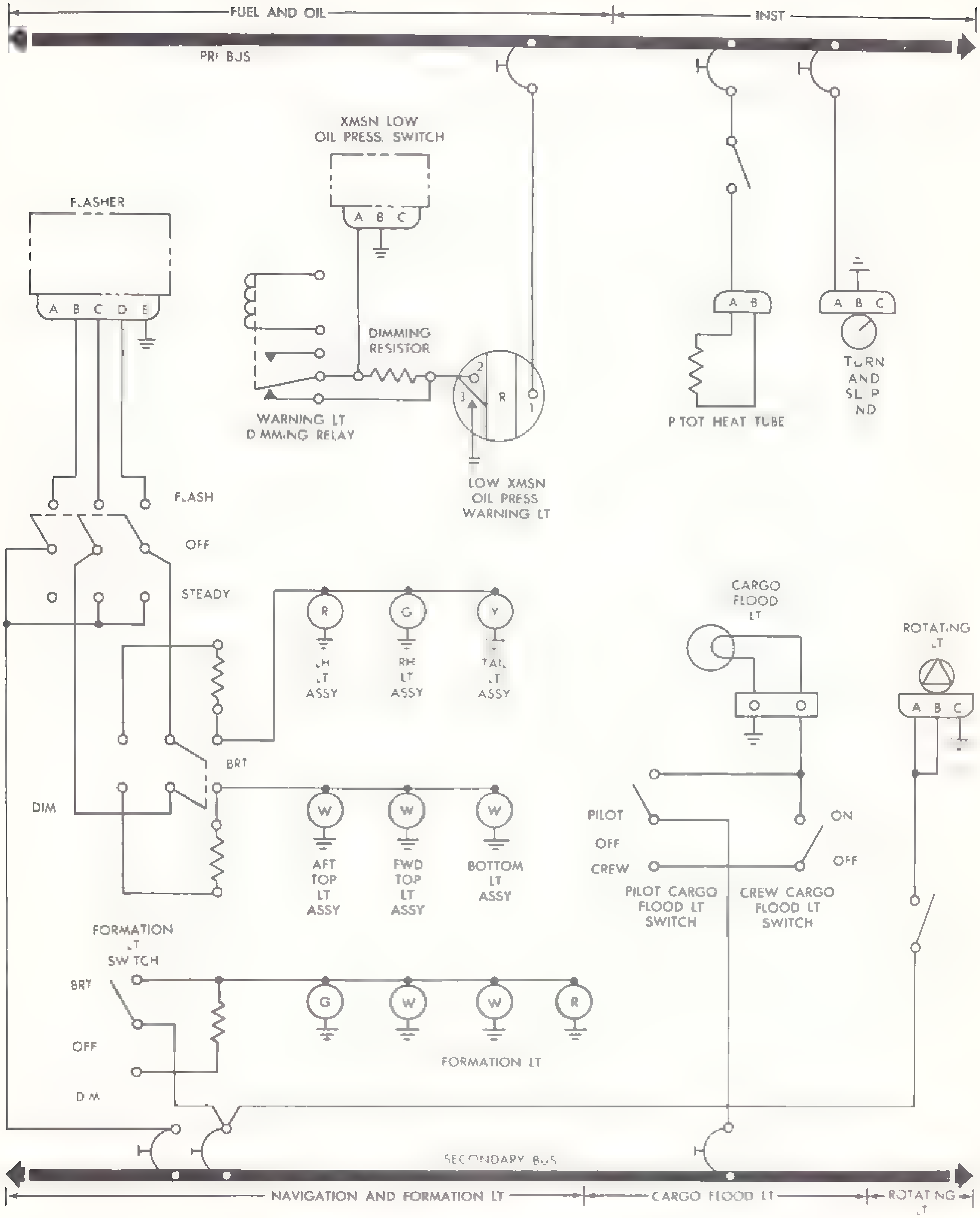


Figure 12–38. DC electrical schematic (Sheet 5 of 9)

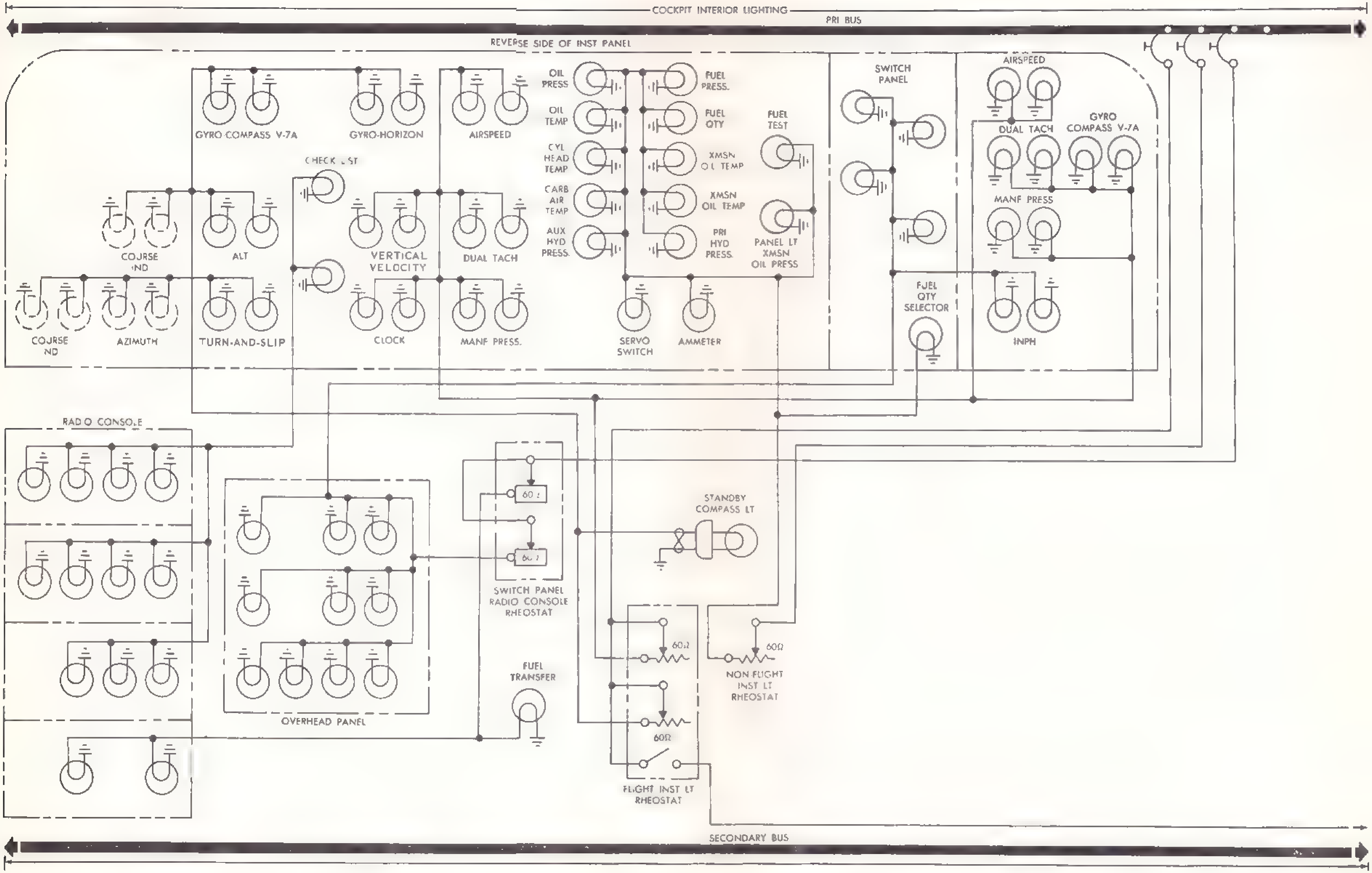


Figure 12–38. DC electrical schematic (Sheet 6 of 9)

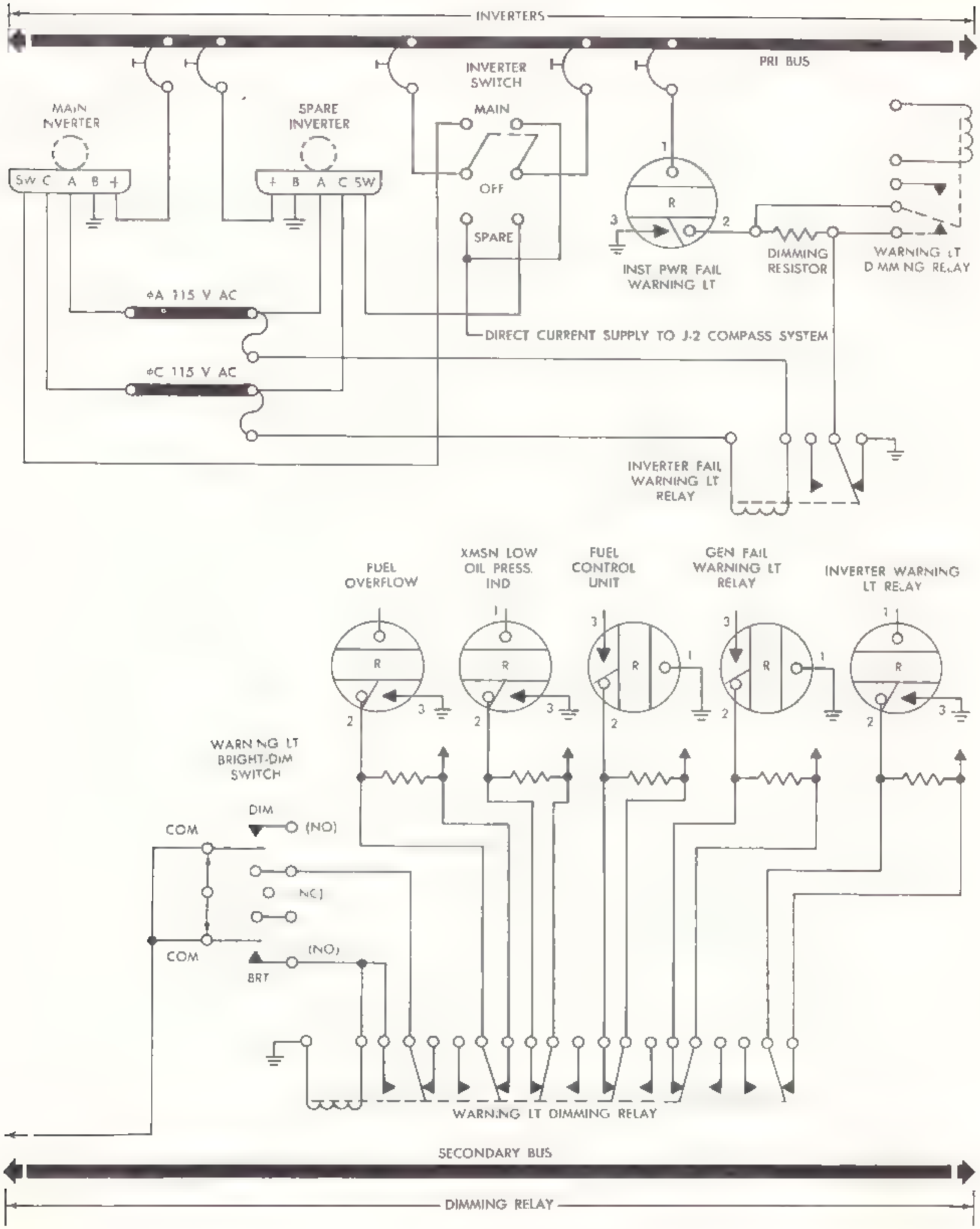


Figure 12-38. DC electrical schematic (Sheet 7 of 9)

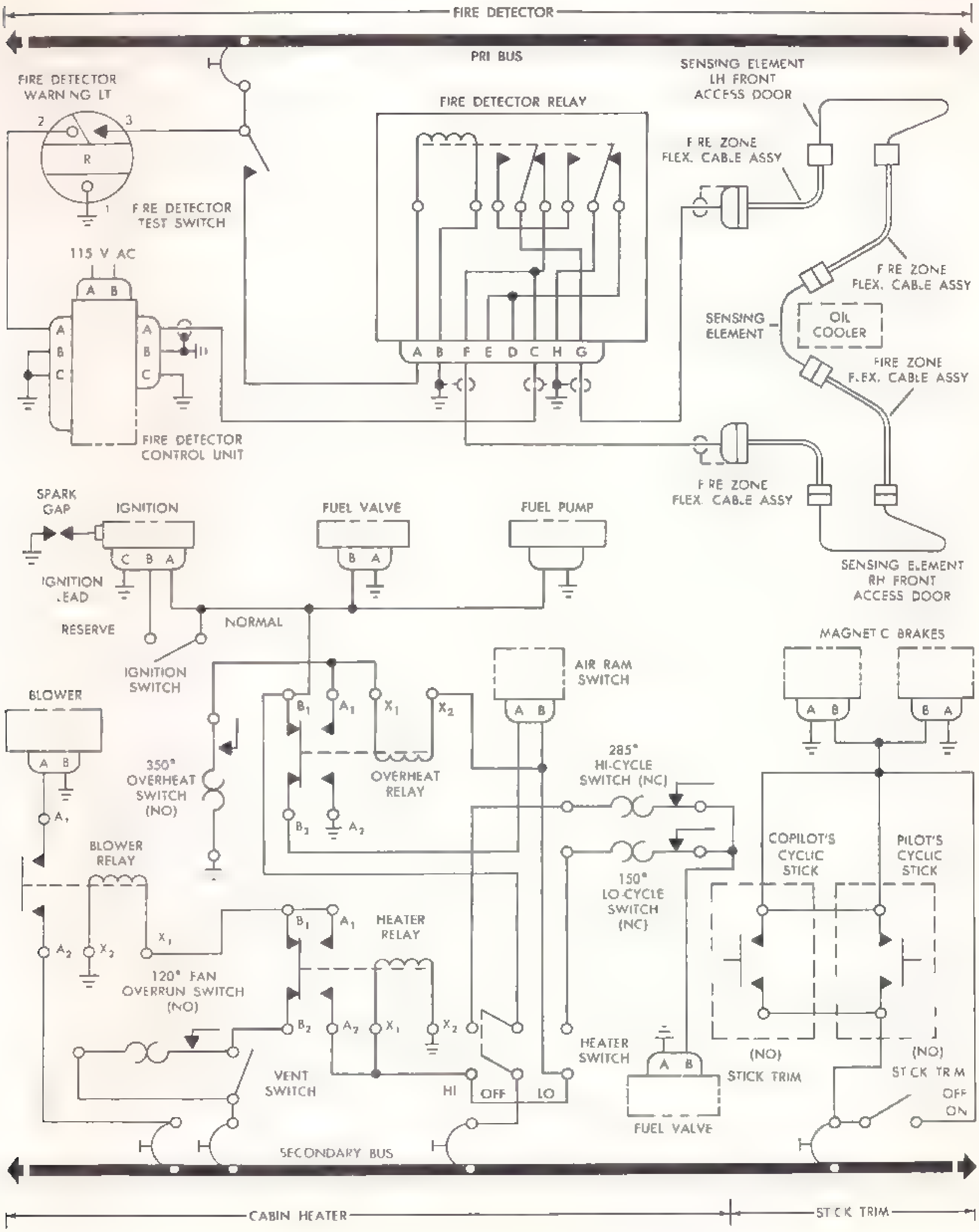
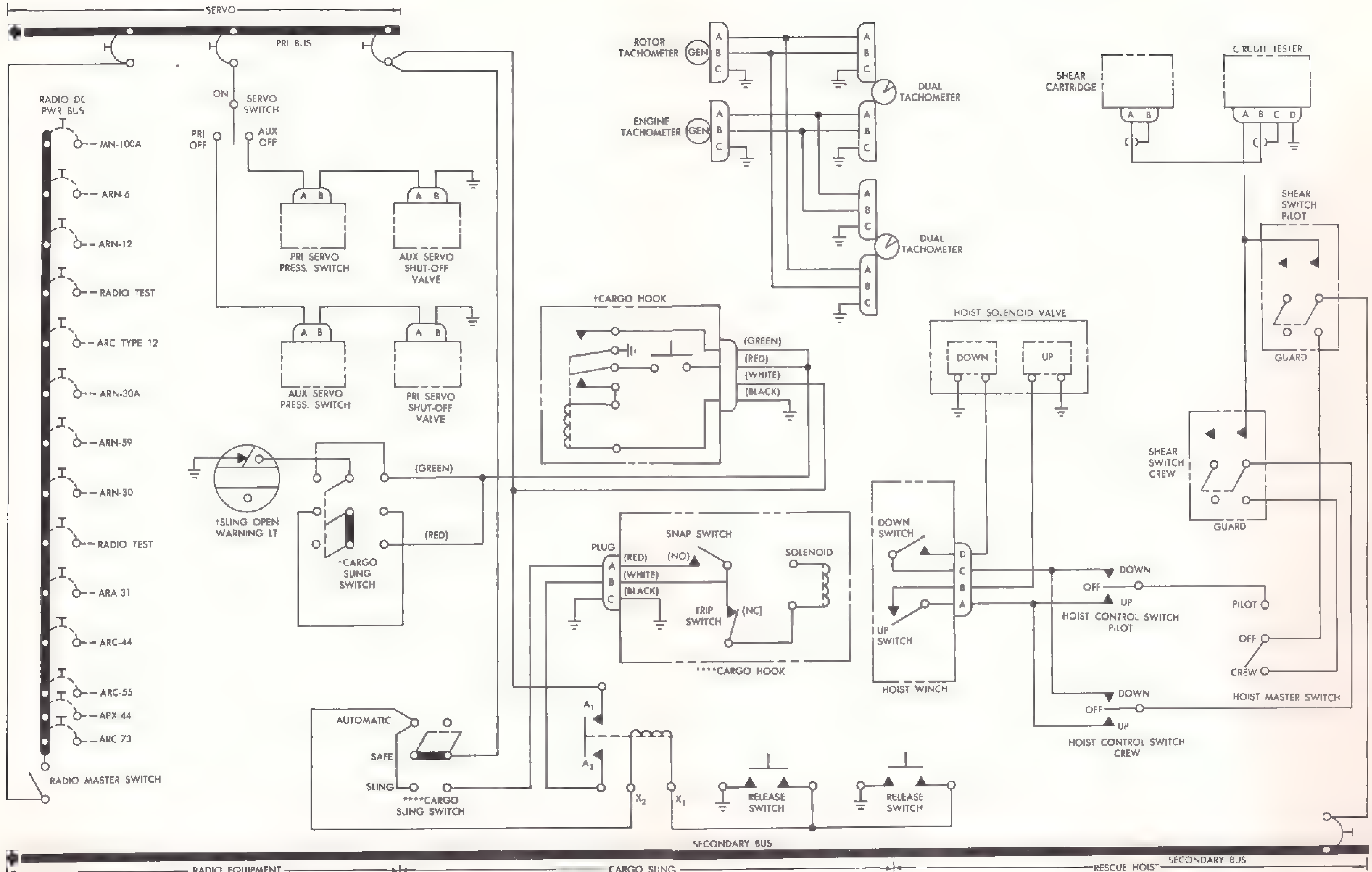


Figure 12-38. DC electrical schematic (Sheet 8 of 9)



****MODEL CH-34A SERIAL No. PRIOR TO 56-4313

†MODEL CH-34A SERIAL No. 56-4313 THROUGH 57-1741 AND MODEL CH-34C

Figure 12–38. DC electrical schematic (Sheet 9 of 9)

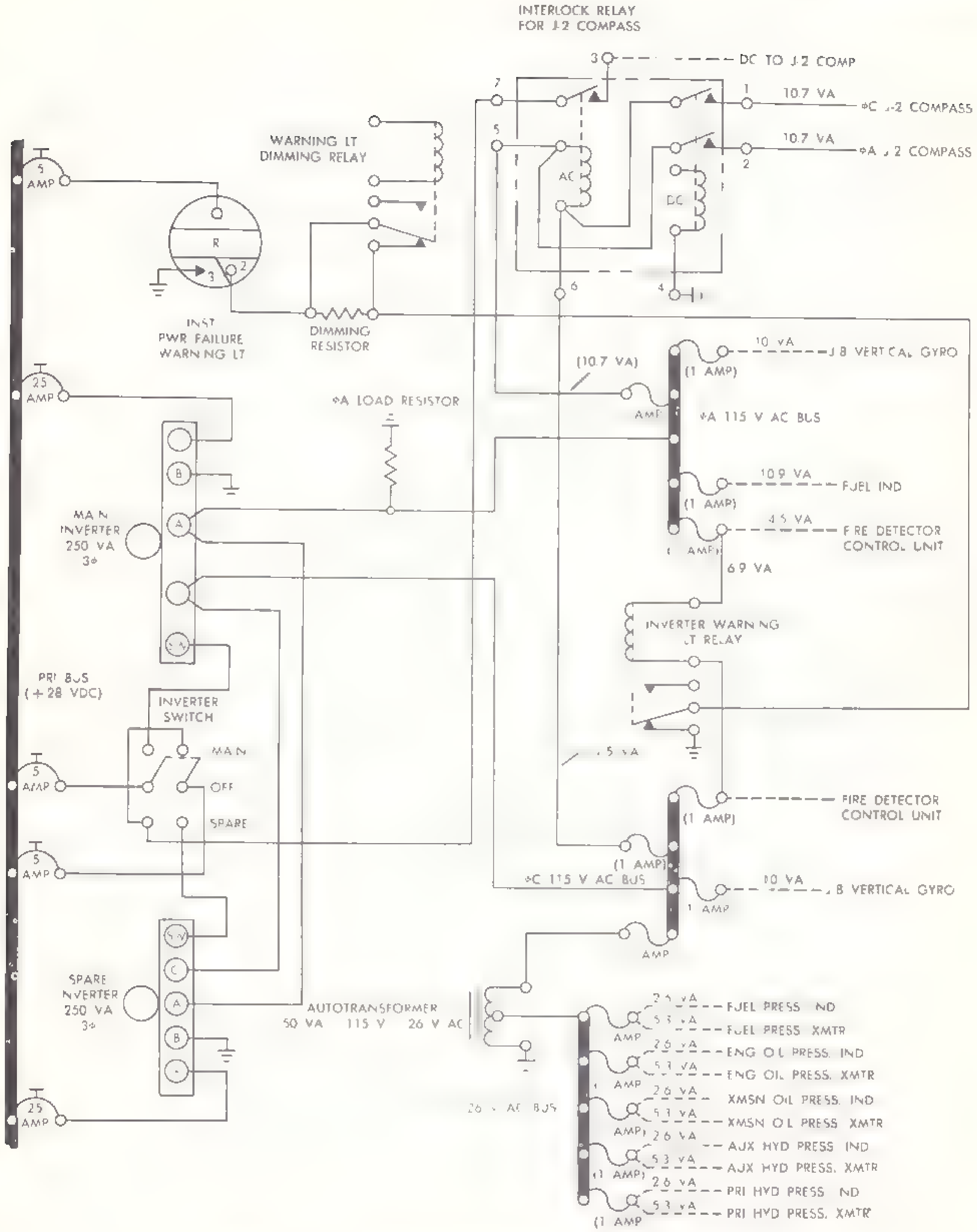


Figure 12—39. AC electrical schematic (helicopters serial No. prior to 57-1742)

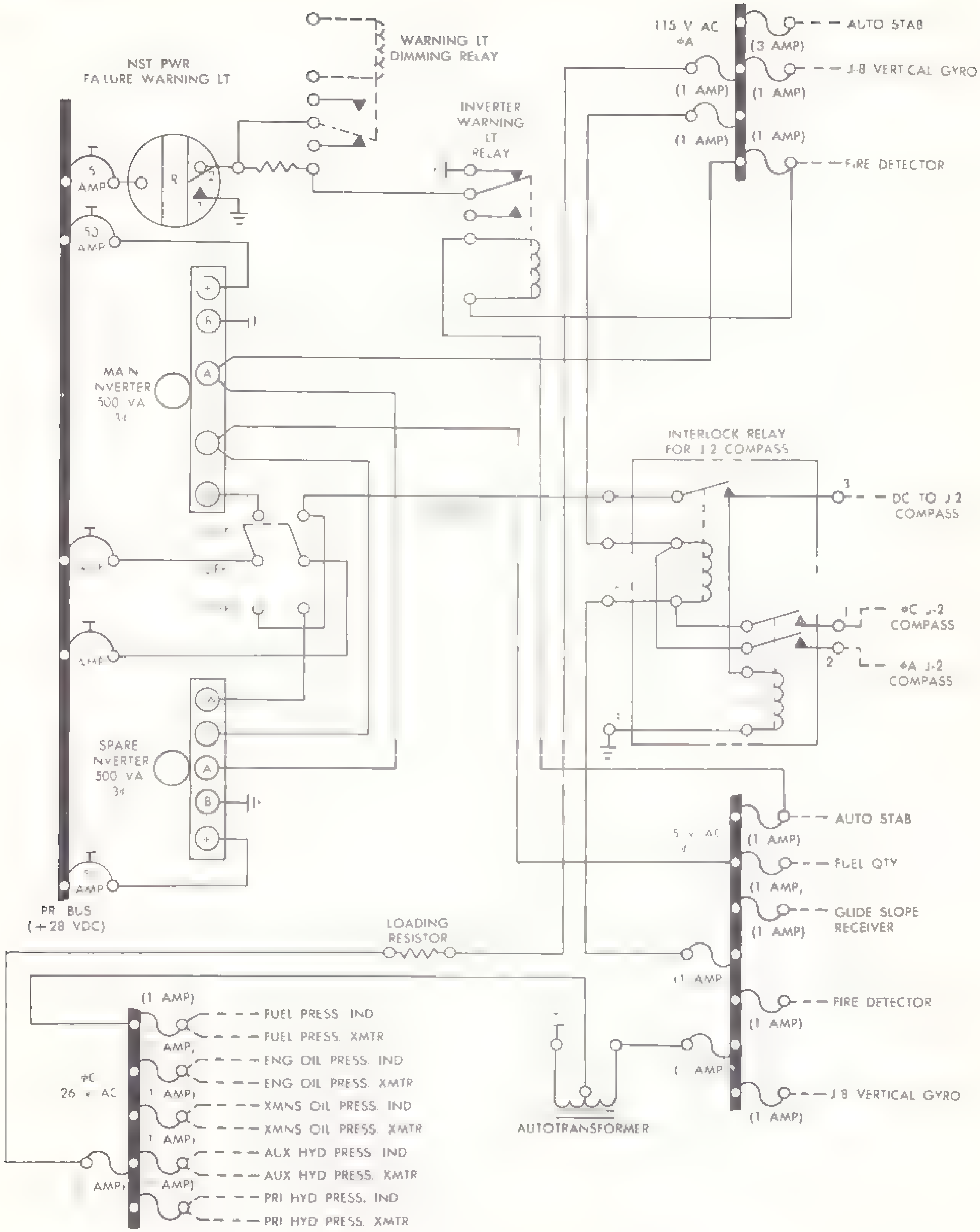
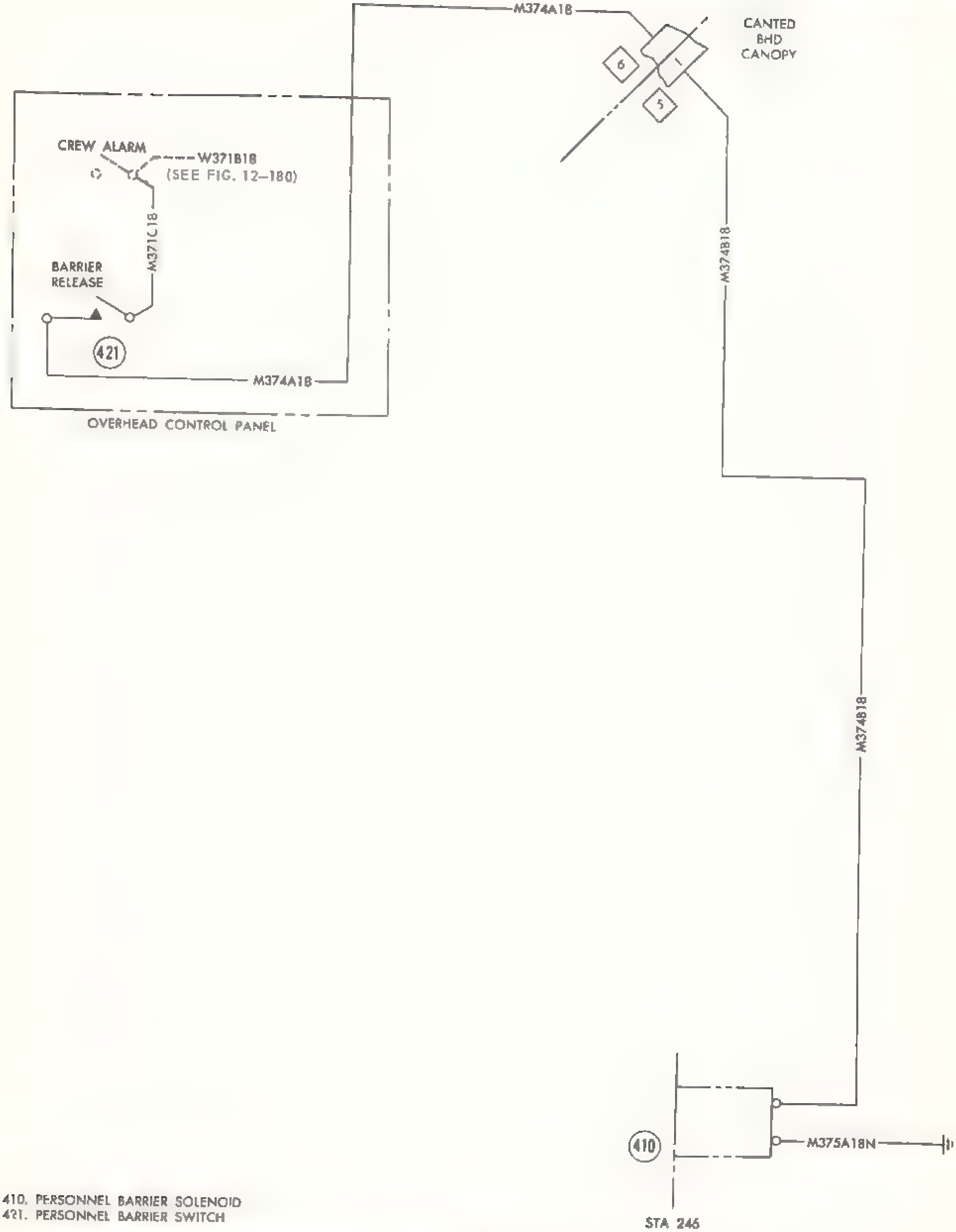
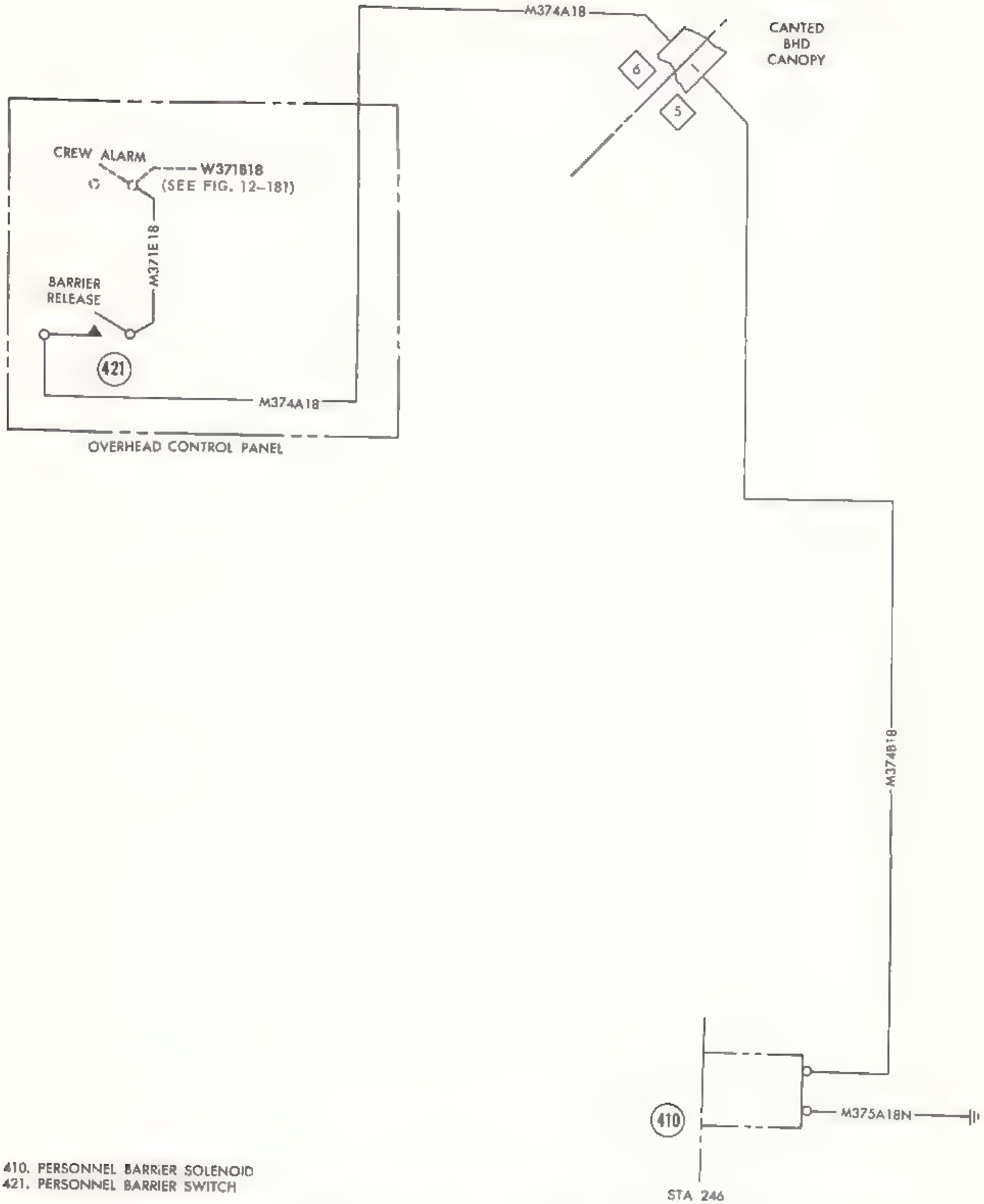


Figure 12–40. AC electrical schematic (model CH-34C, serial No. 57-1742 and subsequent)



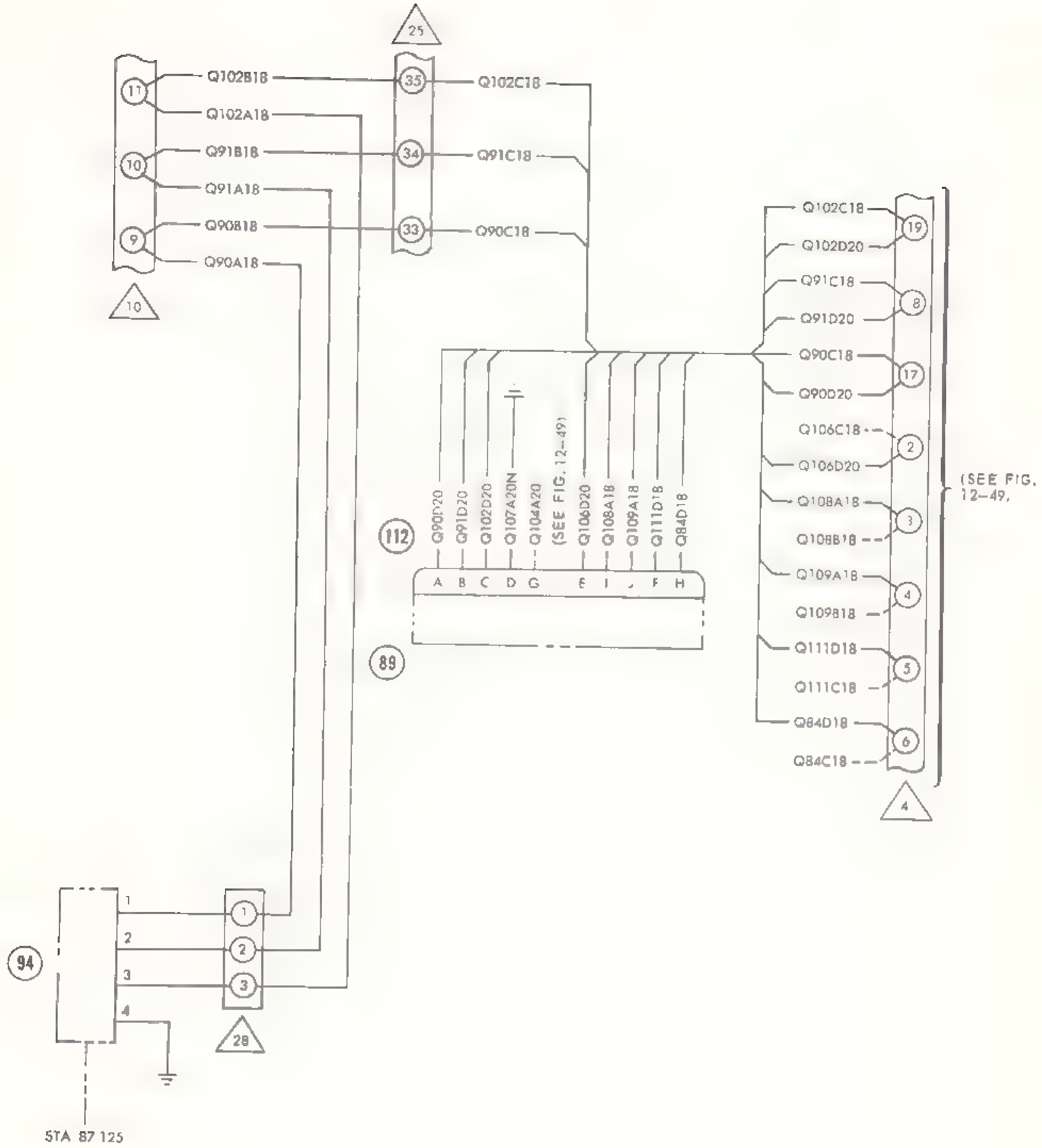
410. PERSONNEL BARRIER SOLENOID
421. PERSONNEL BARRIER SWITCH

Figure 12—41. Personnel barrier, electronics compartment (model CH-34A serial No. prior to 56-4313)



410. PERSONNEL BARRIER SOLENOID
421. PERSONNEL BARRIER SWITCH

Figure 12-42. Personnel barrier electronics compartment (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



89 LEVEL CONTROL UNIT
94 FUEL DETECTOR
112 DISCONNECT PLUG

Figure 12—43. Fuel overflow safety switch (model CH-34A serial No. prior to 56-4313)

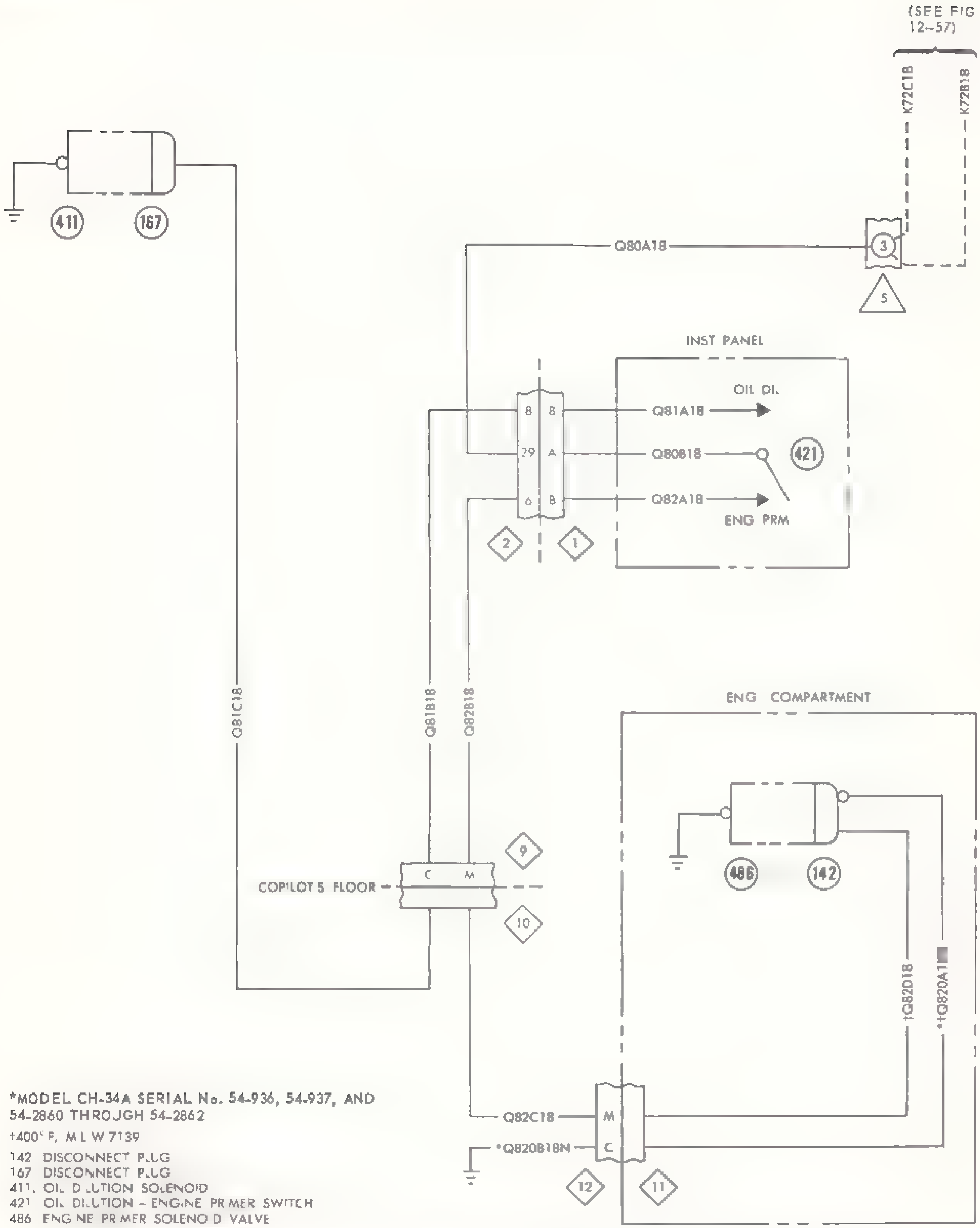
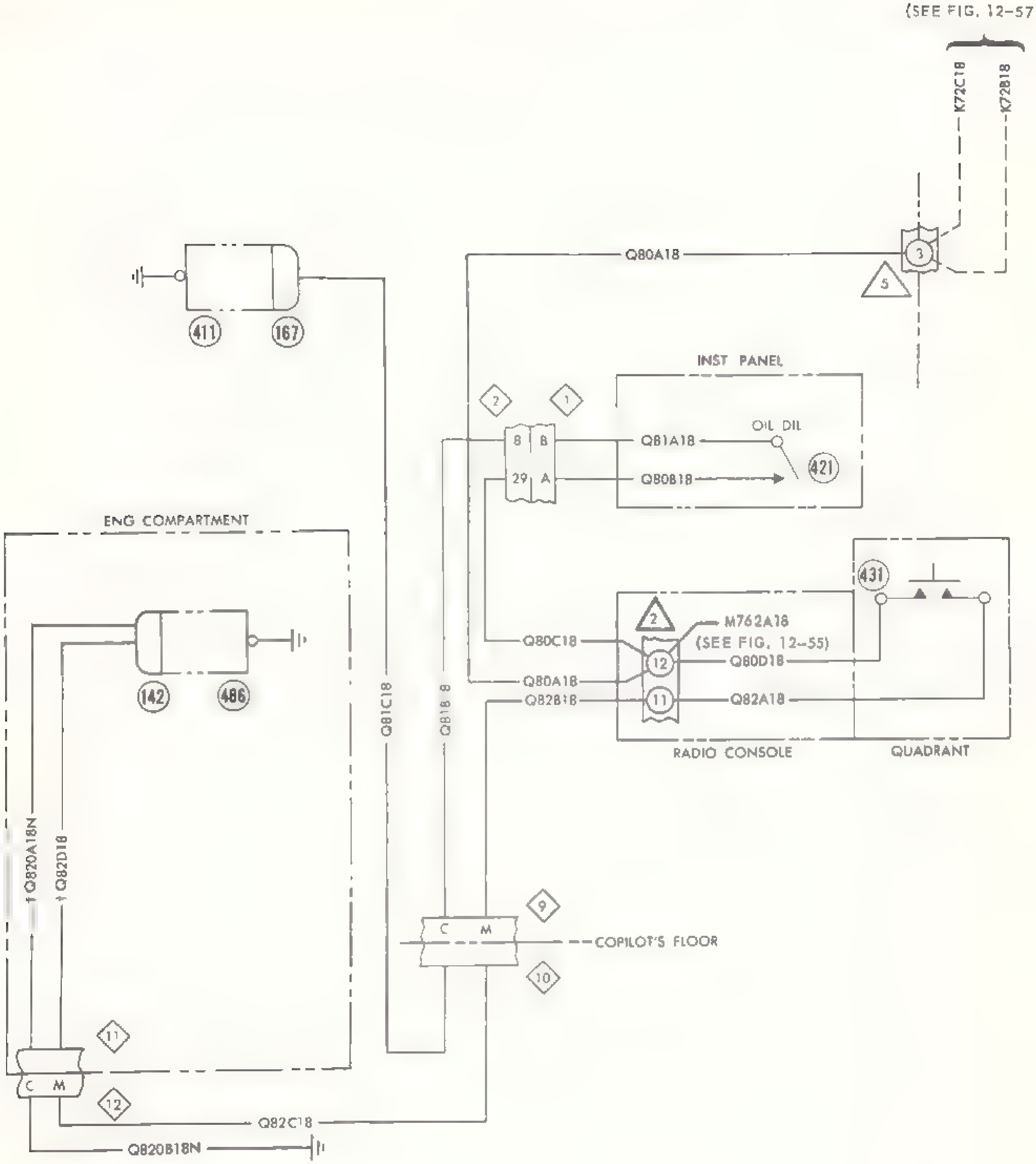


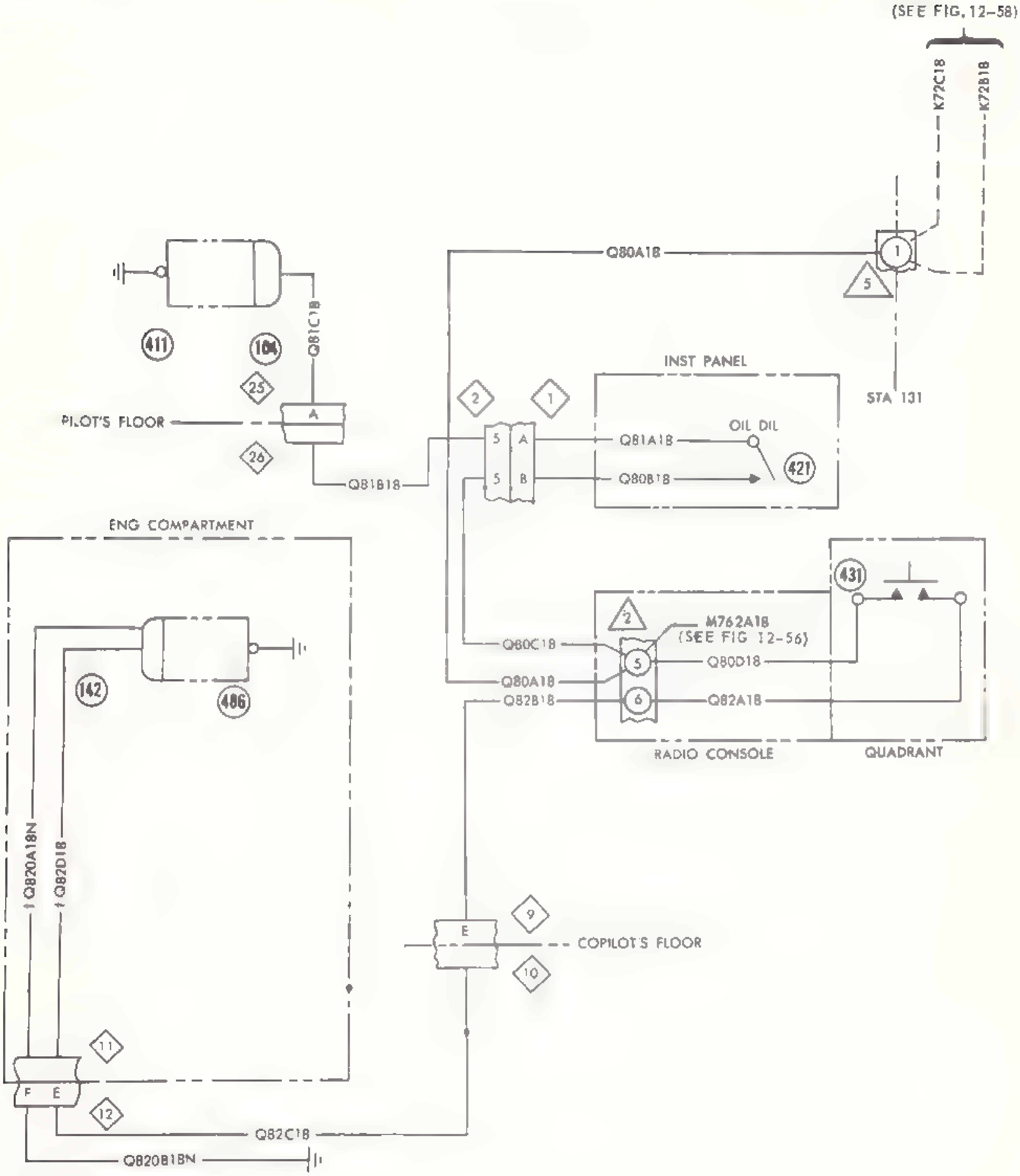
Figure 12—44. Engine primer and oil dilution (model CH-34A serial No. prior to 54-2862)



†400°F, MIL-W-7139

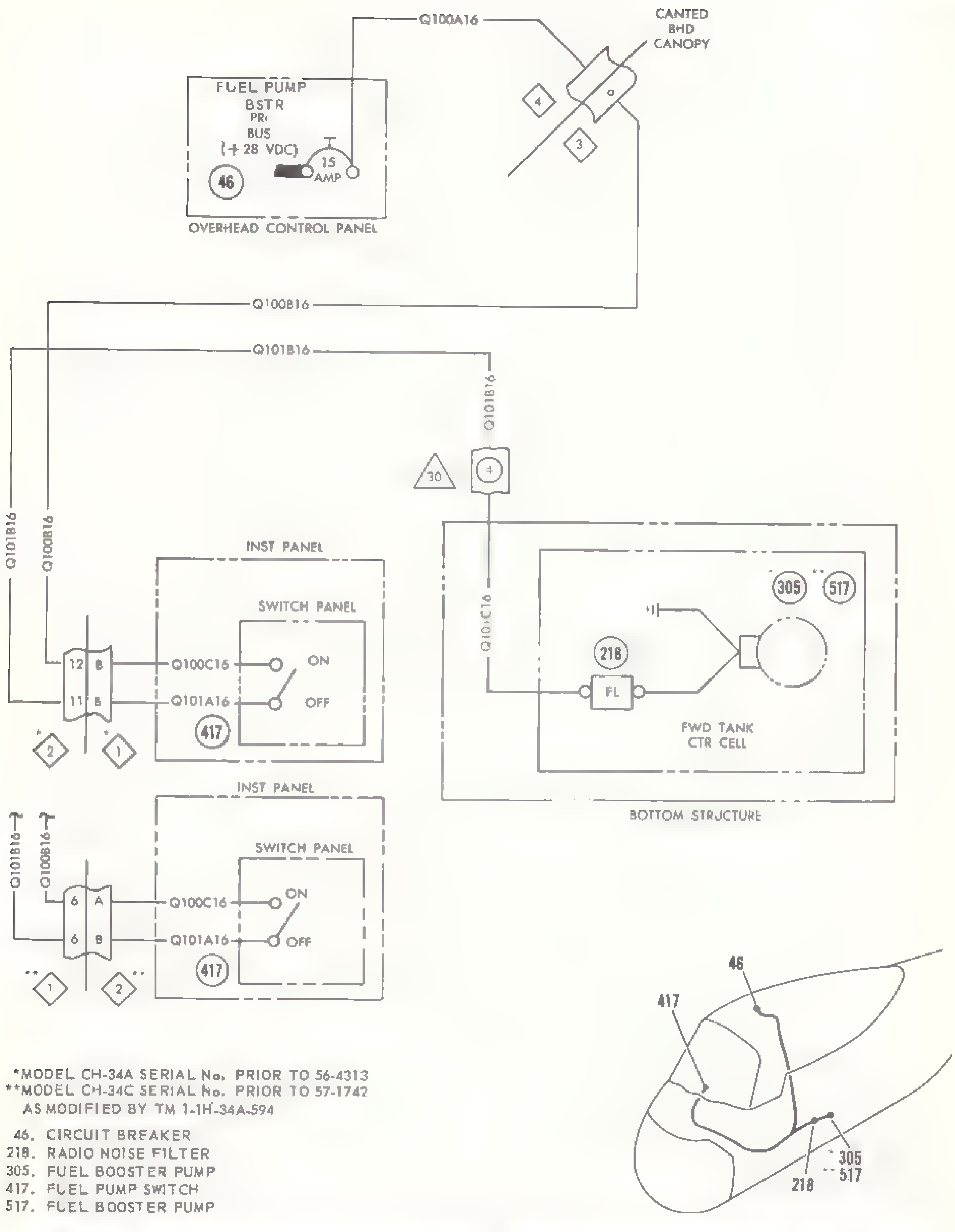
142 DISCONNECT PLUG
167. DISCONNECT PLUG
411 OIL DILUTION SOLENOID
421. OIL DILUTION SWITCH
431. ENGINE PRIMER SWITCH
486. ENGINE PRIMER SOLENOID VALVE

Figure 12—45. Engine primer and oil dilution (model CH-34A serial No. 54-2862 through 56-4312)



†400°F, MIL-W-7139
104. DISCONNECT PLUG
142. DISCONNECT PLUG
411. OIL DILUTION SOLENOID
421. OIL DILUTION SWITCH
431. ENGINE PRIMER SWITCH
486. ENGINE PRIMER SOLENOID VALVE

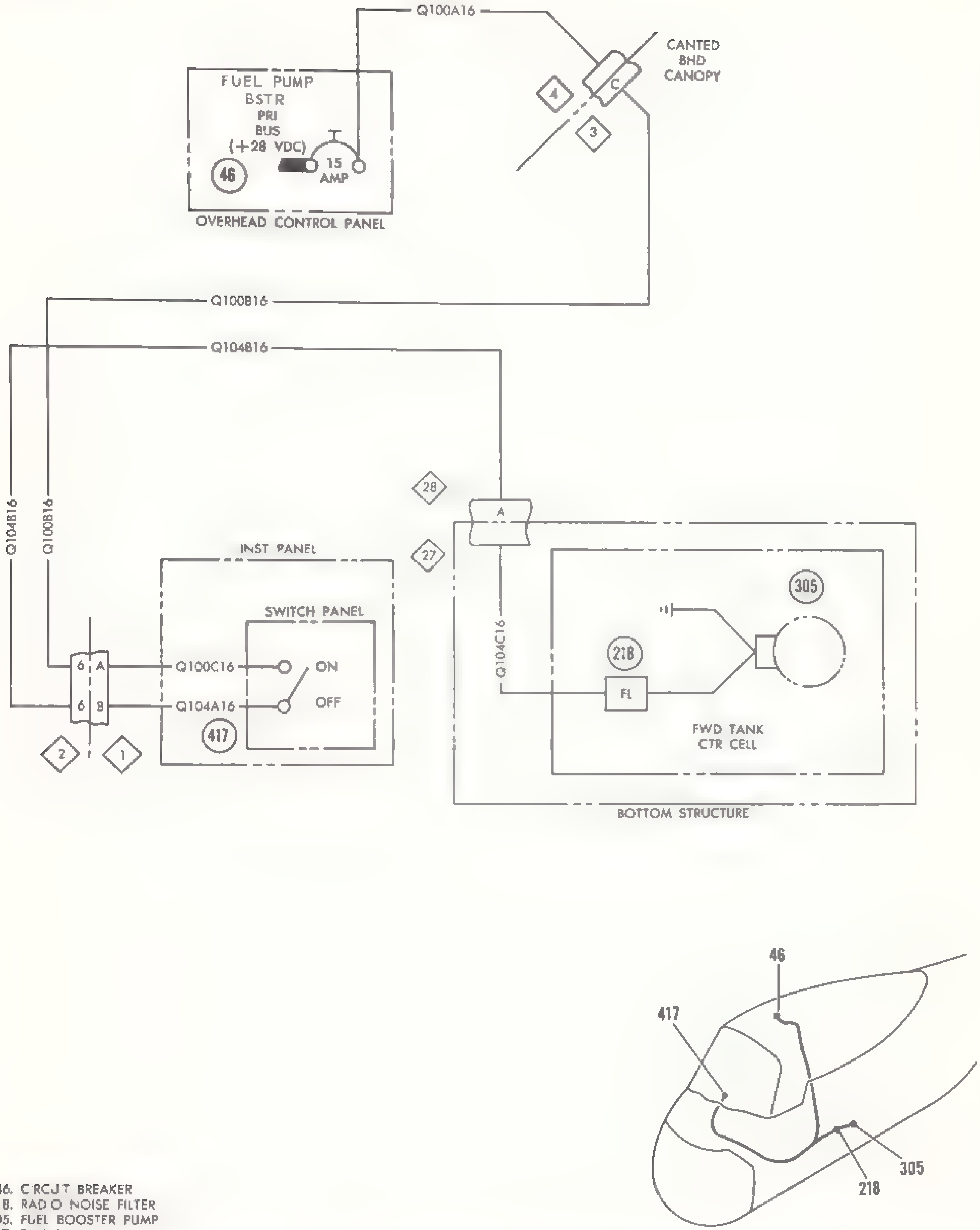
Figure 12—46 Engine primer and oil dilution (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



*MODEL CH-34A SERIAL No. PRIOR TO 56-4313
**MODEL CH-34C SERIAL No. PRIOR TO 57-1742
AS MODIFIED BY TM 1-1H-34A-594

46. CIRCUIT BREAKER
218. RADIO NOISE FILTER
305. FUEL BOOSTER PUMP
417. FUEL PUMP SWITCH
517. FUEL BOOSTER PUMP

Figure 12—47. Fuel booster pump (model CH-34A serial No. prior to 56-4313 and model CH 34C serial No. prior to 57-1742)



46. CIRCUIT BREAKER
218. RADIO NOISE FILTER
305. FUEL BOOSTER PUMP
417. FUEL PUMP SWITCH

Figure 12—48. Fuel booster pump (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C serial No. 57-1742 and subsequent)

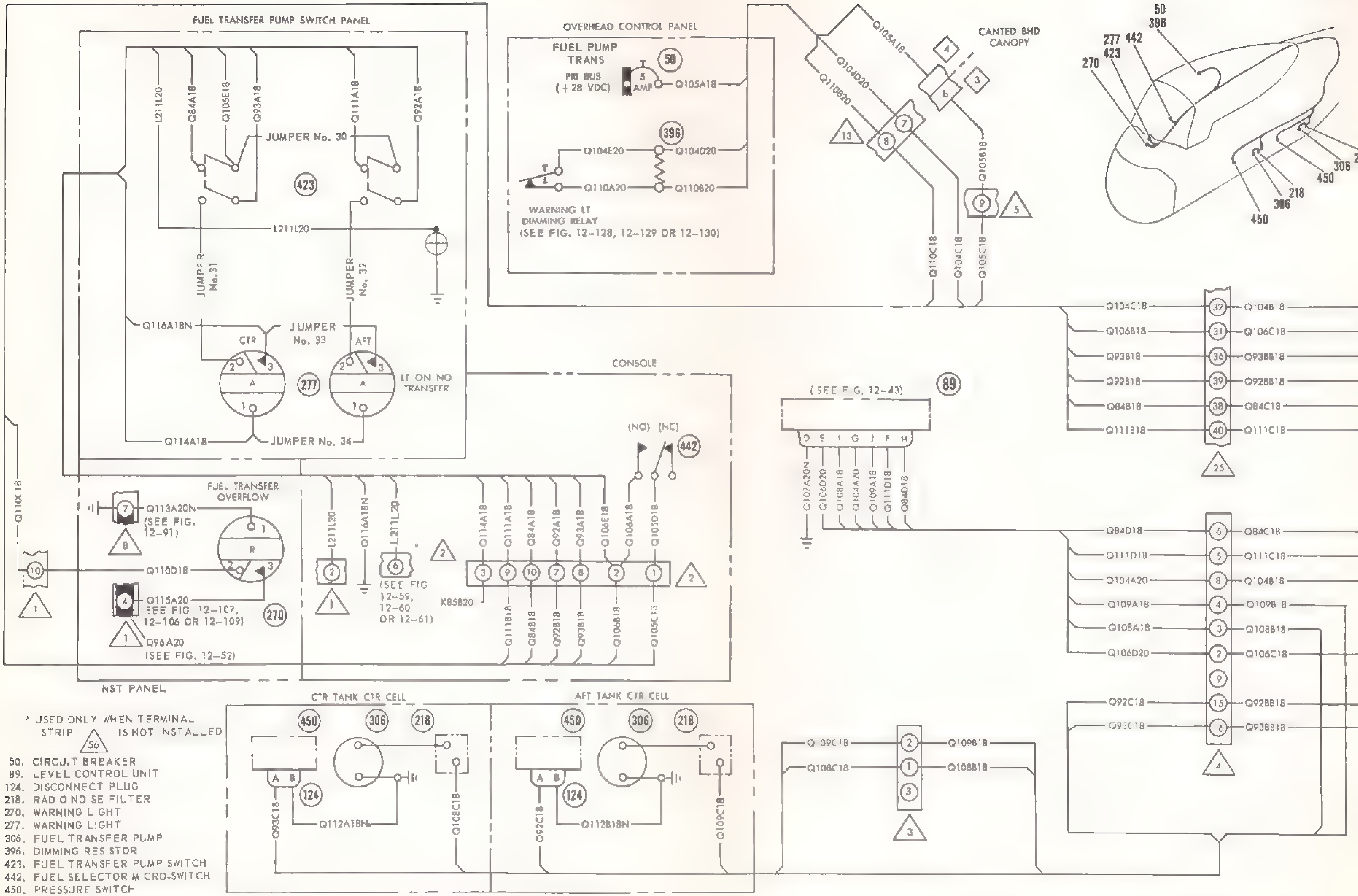


Figure 12—49. Fuel transfer pumps and fuel low pressure warning (model CH-34A serial No. prior to 56-4313)

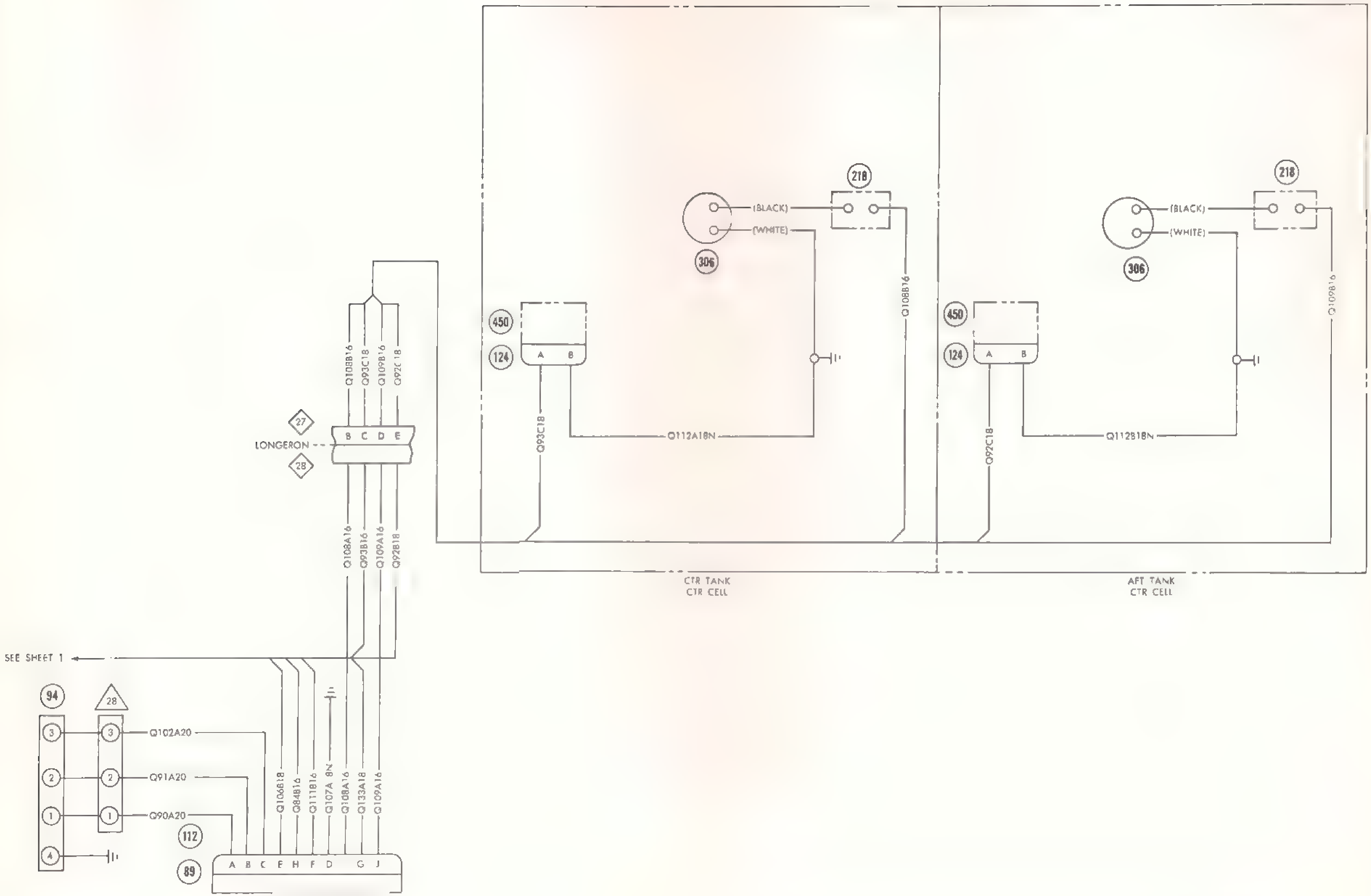
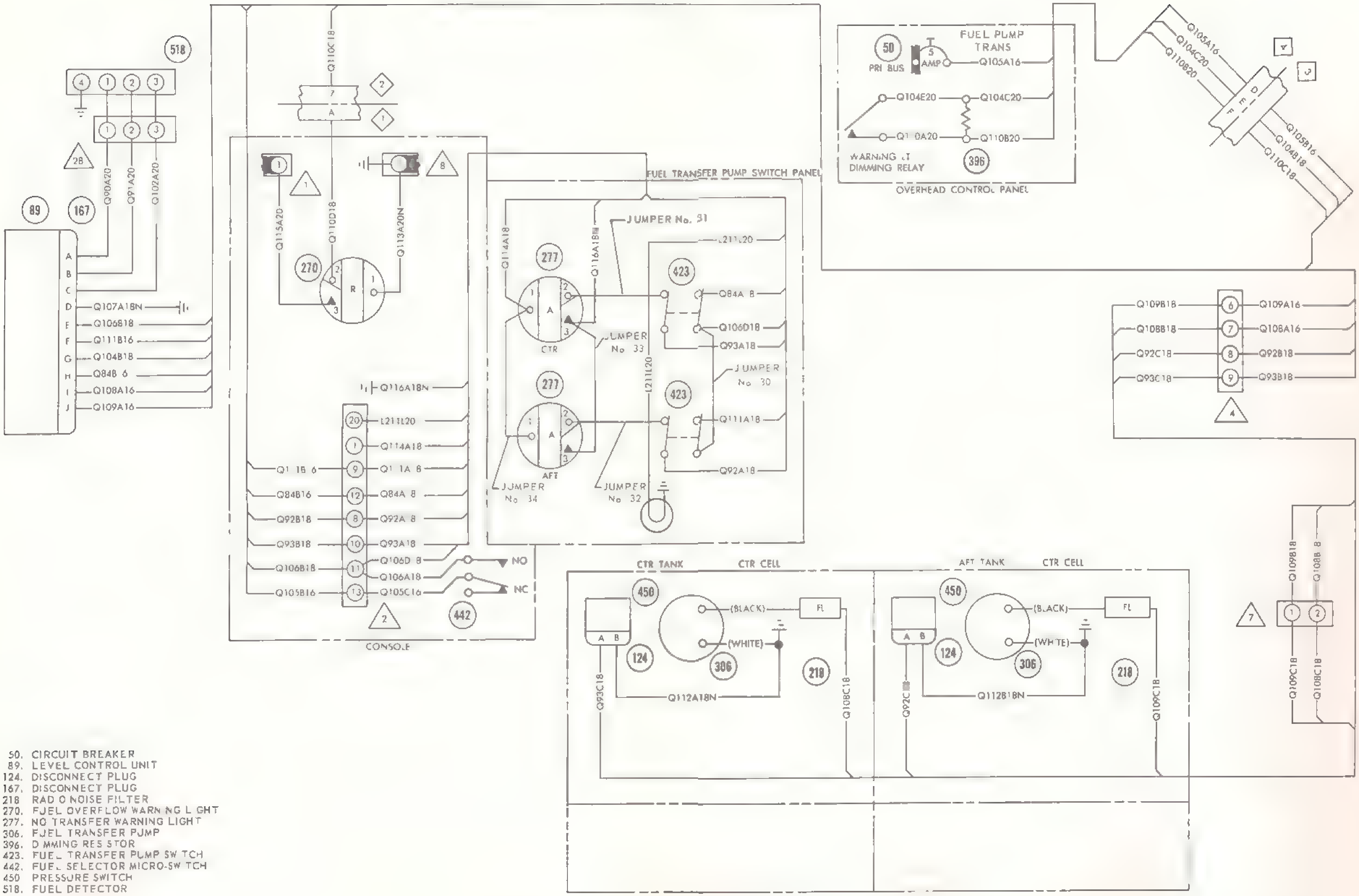
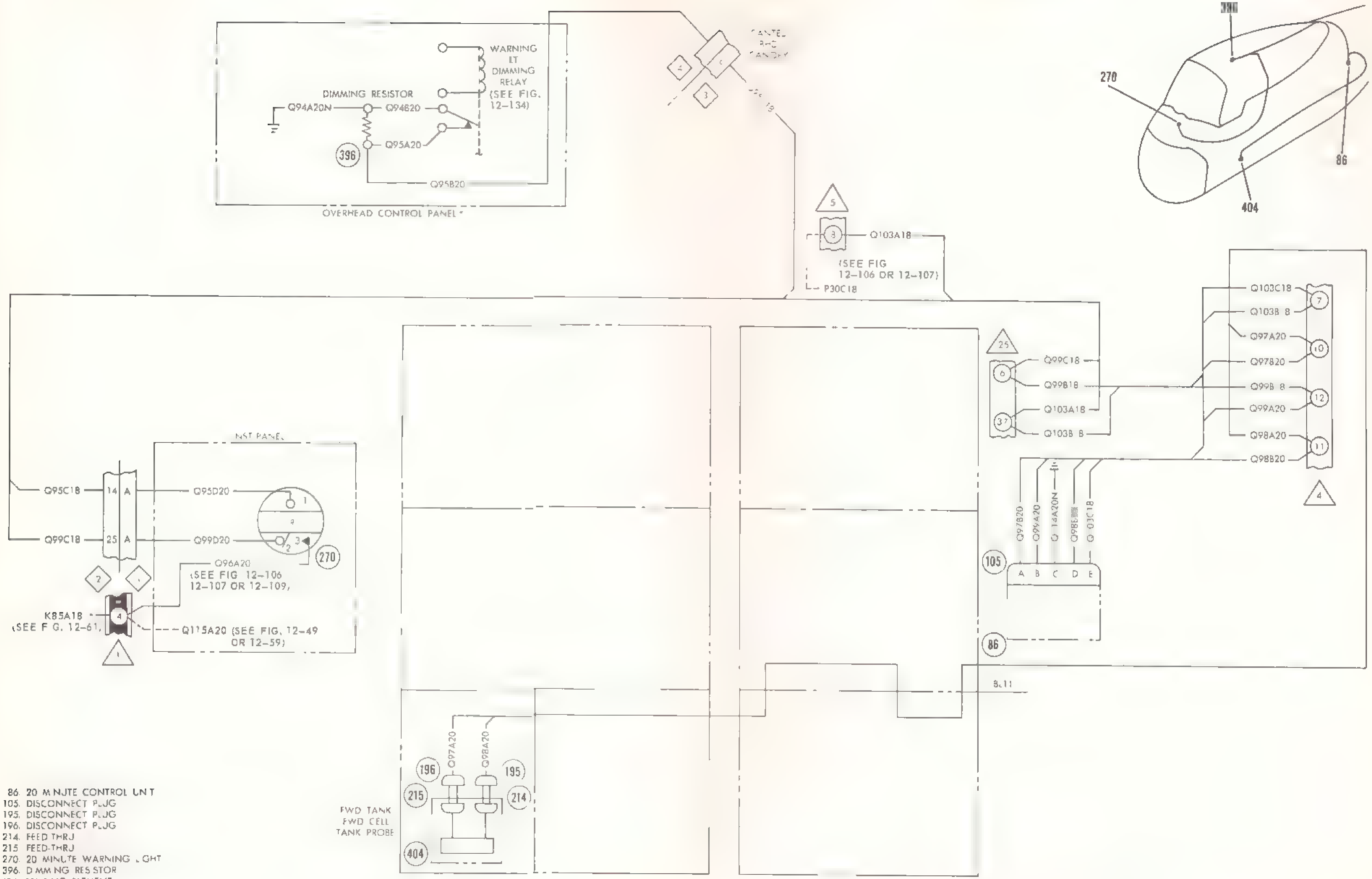


Figure 12—50. Fuel transfer pumps, low pressure switch and fuel overflow safety switch (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C serial No. 57-1742 and subsequent) (Sheet 2 of 2)



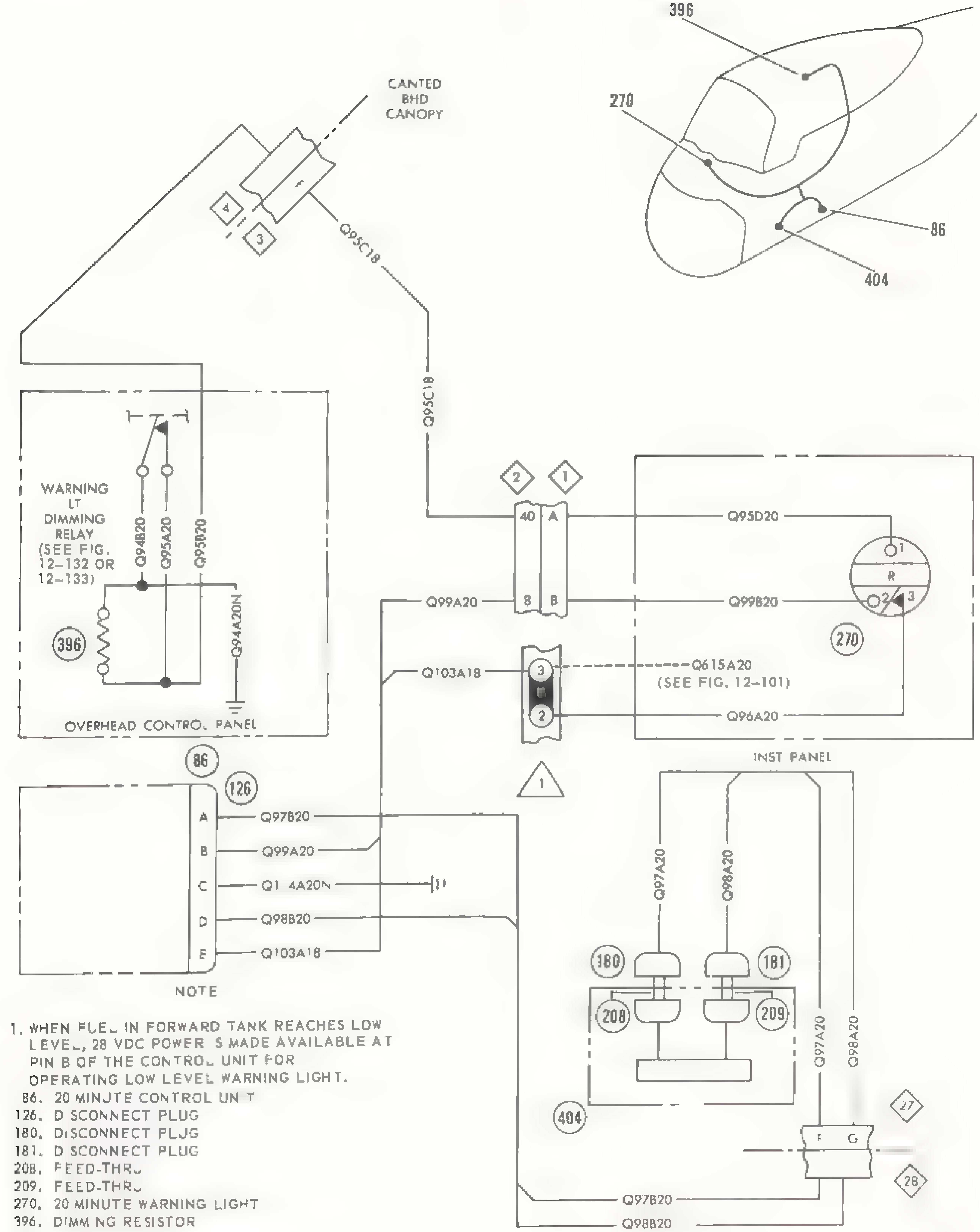
50. CIRCUIT BREAKER
89. LEVEL CONTROL UNIT
124. DISCONNECT PLUG
167. DISCONNECT PLUG
218 RADIO NOISE FILTER
270. FUEL OVERFLOW WARNING LIGHT
277. NO TRANSFER WARNING LIGHT
306. FUEL TRANSFER PUMP
396. DIMMING RESISTOR
423. FUEL TRANSFER PUMP SWITCH
442. FUEL SELECTOR MICRO-SWITCH
450 PRESSURE SWITCH
518. FUEL DETECTOR

Figure 12–51. Fuel transfer pumps, low pressure switch, and fuel overflow safety switch (model CH-34C serial No. prior to 57-1742)



86. 20 MINUTE CONTROL UNIT
105. DISCONNECT PLUG
195. DISCONNECT PLUG
196. DISCONNECT PLUG
214. FEED THRU
215. FEED-THRU
270. 20 MINUTE WARNING LIGHT
396. DIMMING RESISTOR
404. SENSING ELEMENT

Figure 12-52. Fuel low level warning (model CH-34A serial No. prior to 56-4313)

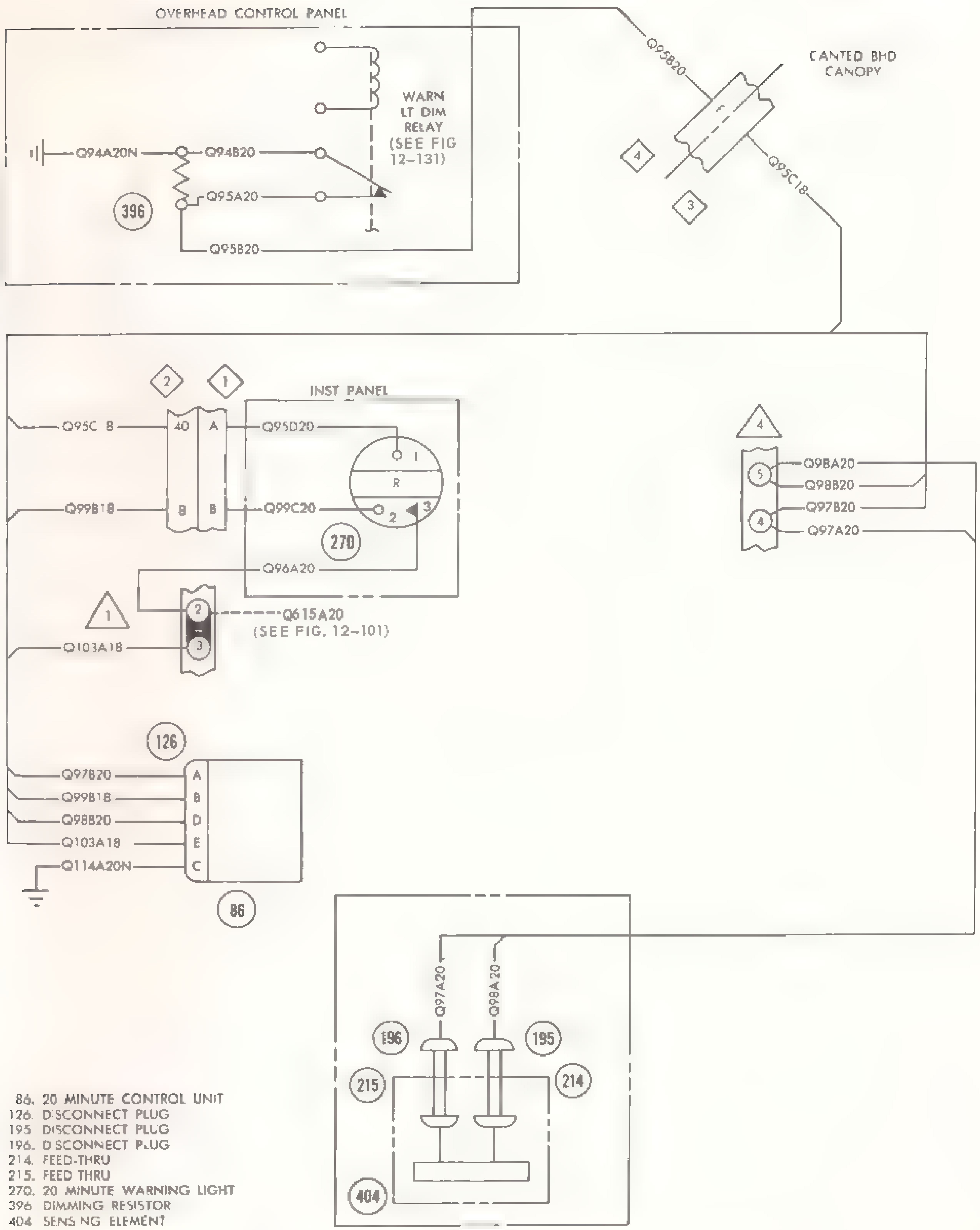


NOTE

1. WHEN FUEL IN FORWARD TANK REACHES LOW LEVEL, 28 VDC POWER IS MADE AVAILABLE AT PIN B OF THE CONTROL UNIT FOR OPERATING LOW LEVEL WARNING LIGHT.

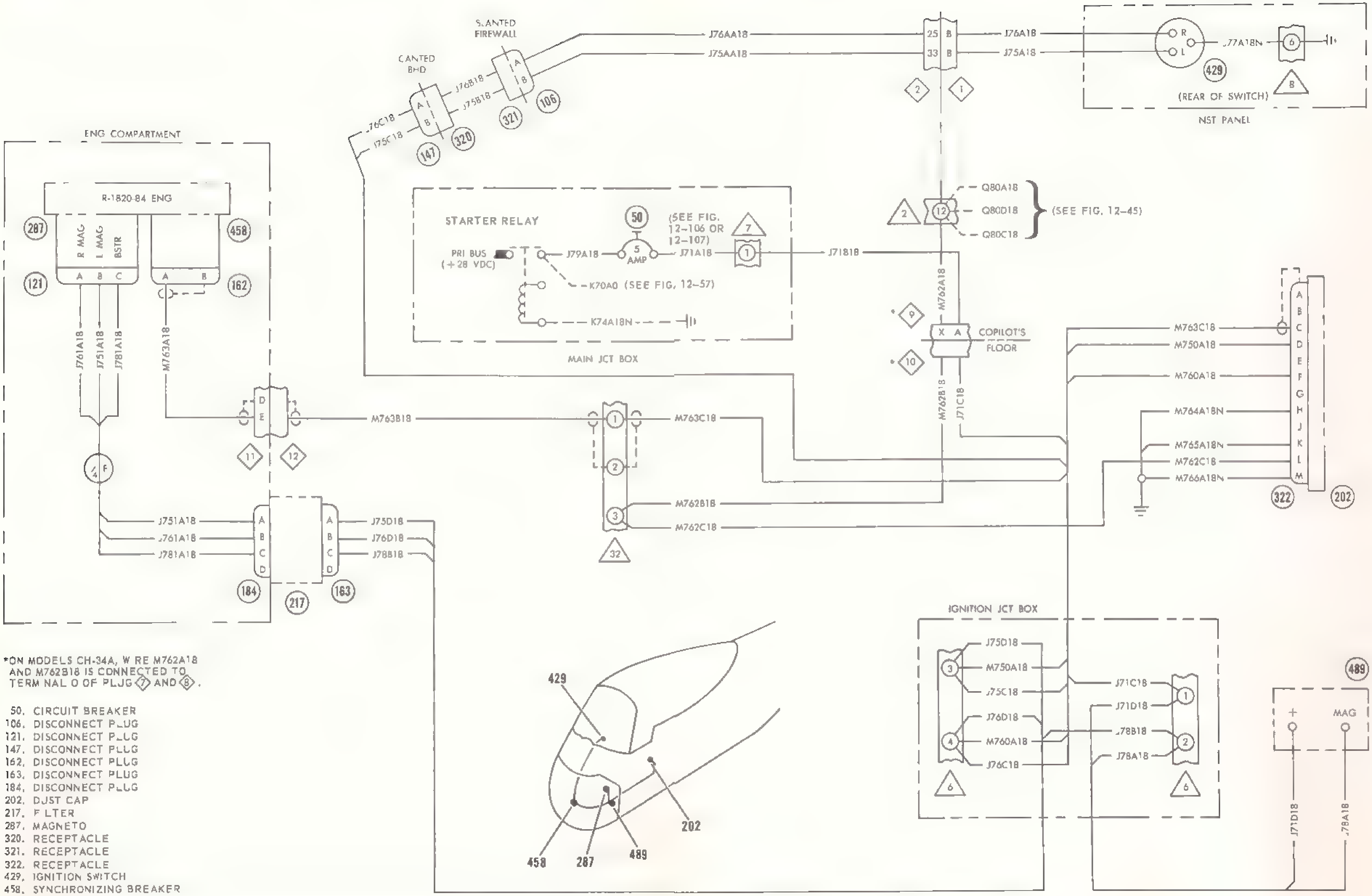
86. 20 MINUTE CONTROL UNIT
126. DISCONNECT PLUG
180. DISCONNECT PLUG
181. DISCONNECT PLUG
208. FEED-THRU
209. FEED-THRU
270. 20 MINUTE WARNING LIGHT
396. DIMMING RESISTOR
404. SENSING ELEMENT

Figure 12–53. Fuel low level warning (model CH-34A serial No. 56-4313 through 57 1741 and model CH 34C serial No. 57-1742 and subsequent)



86. 20 MINUTE CONTROL UNIT
126. DISCONNECT PLUG
195. DISCONNECT PLUG
196. DISCONNECT PLUG
214. FEED-THRU
215. FEED THRU
270. 20 MINUTE WARNING LIGHT
396. DIMMING RESISTOR
404. SENSING ELEMENT

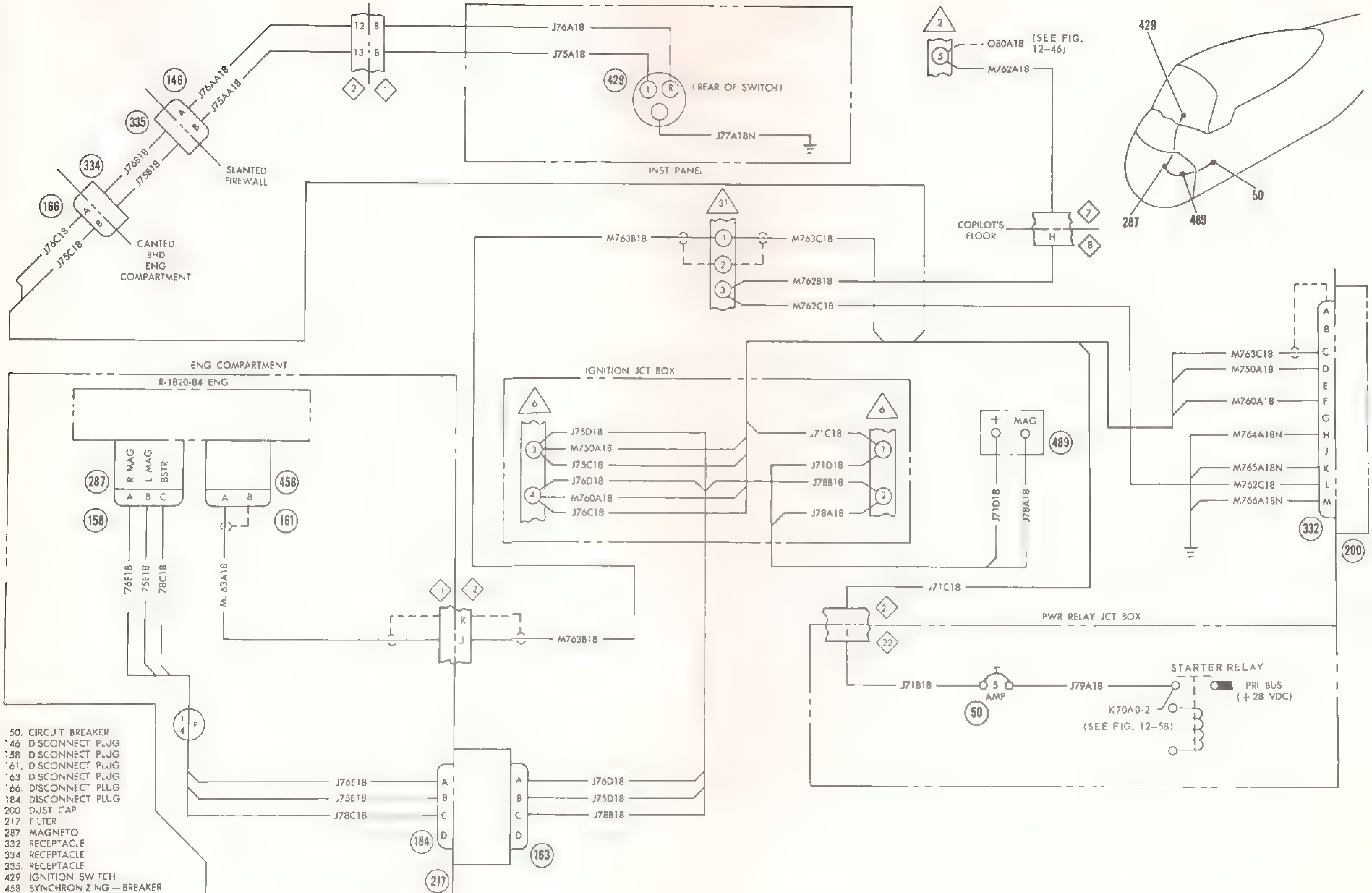
Figure 12—54. Fuel low level warning (model CH-34C serial No. prior to 57-1742)



*ON MODELS CH-34A, W RE M762A18 AND M762B18 IS CONNECTED TO TERM NAL O OF PLUG ⟨7⟩ AND ⟨8⟩.

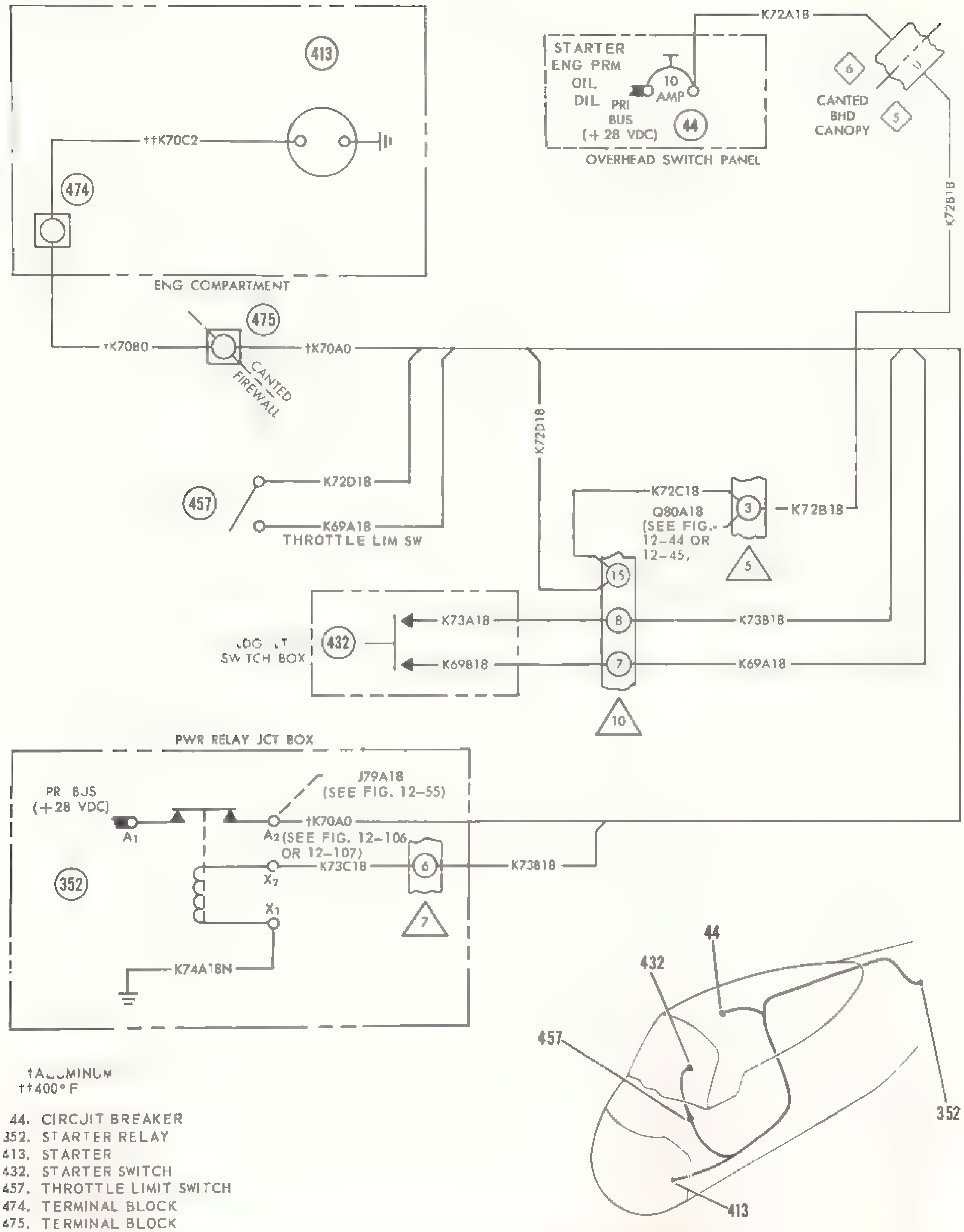
50. CIRCUIT BREAKER
106. DISCONNECT PLUG
121. DISCONNECT PLUG
147. DISCONNECT PLUG
162. DISCONNECT PLUG
163. DISCONNECT PLUG
184. DISCONNECT PLUG
202. DUST CAP
217. F LTER
287. MAGNETO
320. RECEPTACLE
321. RECEPTACLE
322. RECEPTACLE
429. IGNITION SWITCH
458. SYNCHRONIZING BREAKER
489. VIBRATOR

Figure 12—55. Ignition and engine analyzer (model CH-34A serial No. prior to 56-4313)



50. CIRCUIT BREAKER
146. DISCONNECT PLUG
158. DISCONNECT PLUG
161. DISCONNECT PLUG
163. DISCONNECT PLUG
166. DISCONNECT PLUG
184. DISCONNECT PLUG
200. DUST CAP
217. FILTER
287. MAGNETO
332. RECEPTACLE
334. RECEPTACLE
335. RECEPTACLE
429. IGNITION SWITCH
458. SYNCHRONIZING—BREAKER
489. VIBRATOR

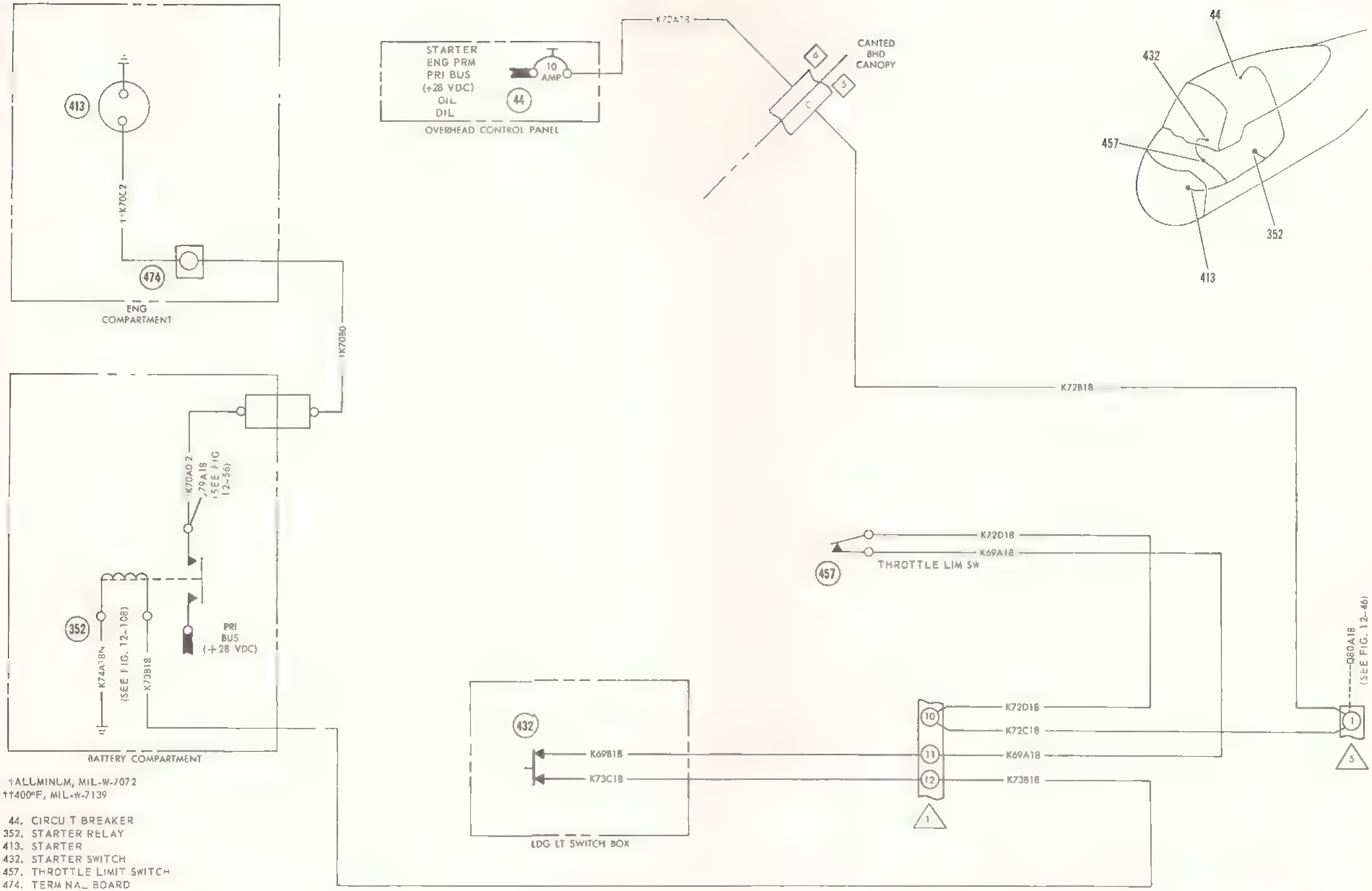
Figure 12—56. Ignition and engine analyzer (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



†ALUMINUM
††400° F

44. CIRCUIT BREAKER
352. STARTER RELAY
413. STARTER
432. STARTER SWITCH
457. THROTTLE LIMIT SWITCH
474. TERMINAL BLOCK
475. TERMINAL BLOCK

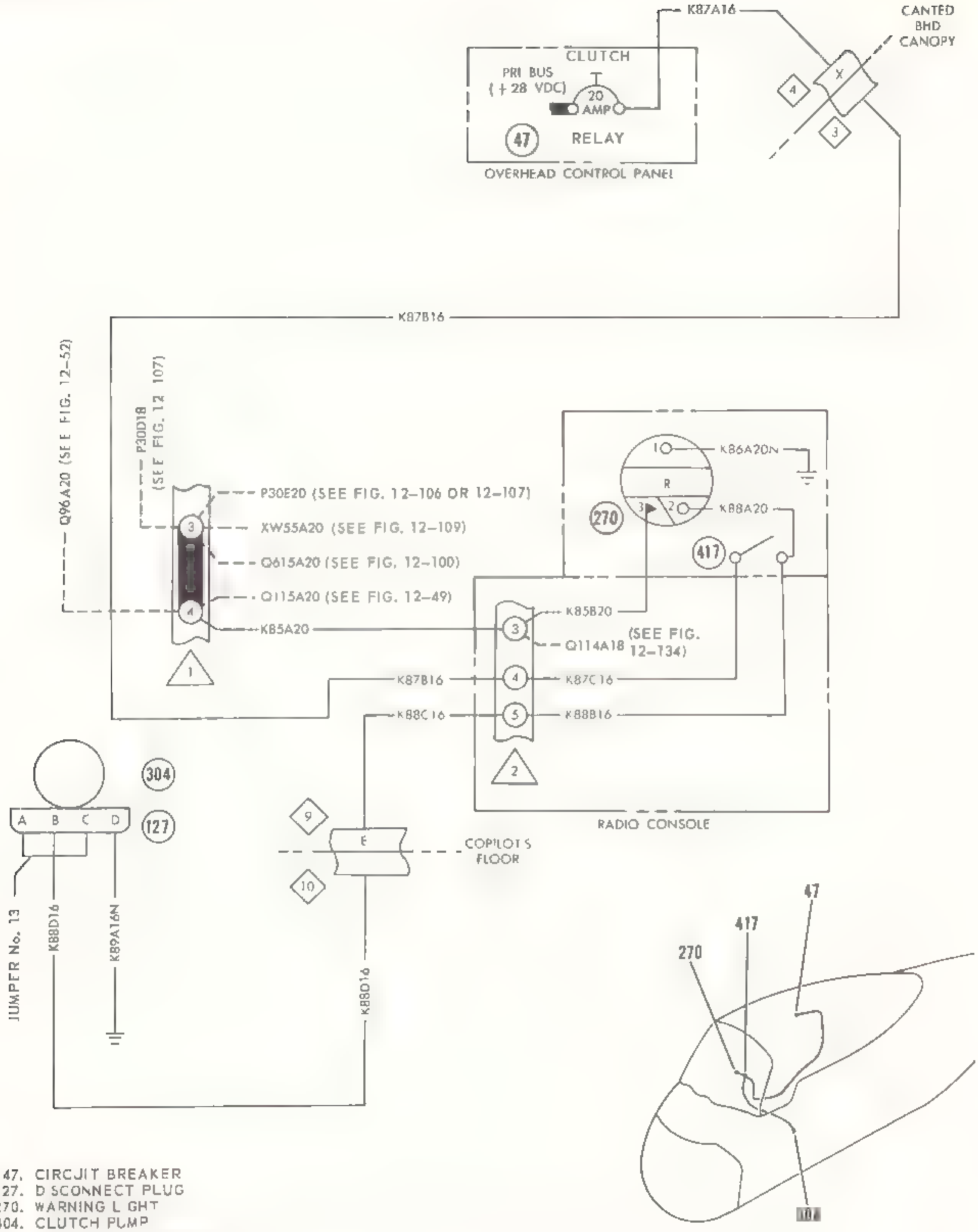
Figure 12–57. Starter (model CH 34A serial No. prior to 56-4313)



†ALUMINUM, MIL-W-7072
††400°F, MIL-W-7139

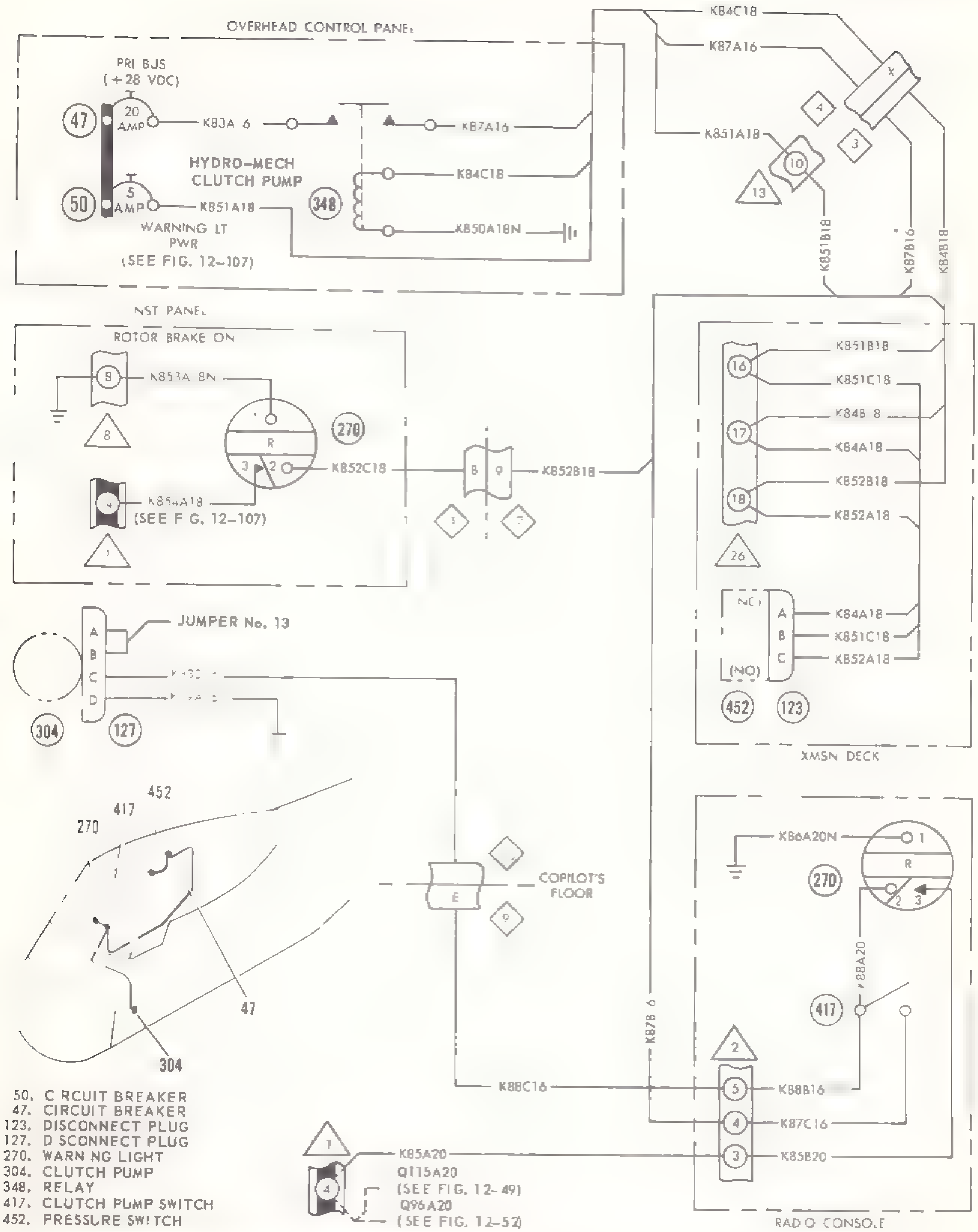
44. CIRCUIT BREAKER
352. STARTER RELAY
413. STARTER
432. STARTER SWITCH
457. THROTTLE LIMIT SWITCH
474. TERMINAL BOARD

Figure 12—58. Starter (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



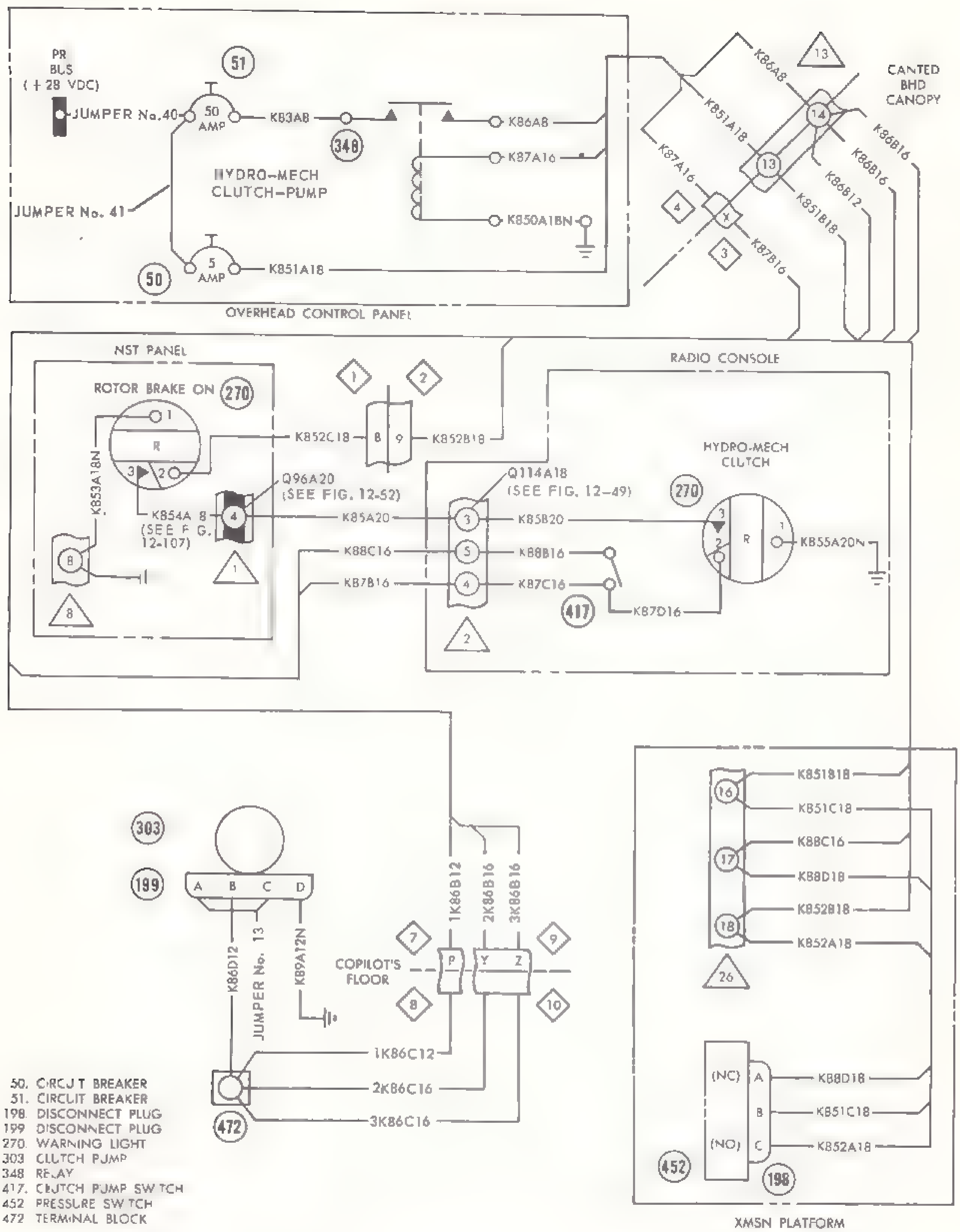
47. CIRCUIT BREAKER
127. DISCONNECT PLUG
270. WARNING LIGHT
304. CLUTCH PUMP
417. CLUTCH PUMP SWITCH

Figure 12–59. Hydro-mechanical clutch pump (model CH-34A serial No. prior to 55-4462)



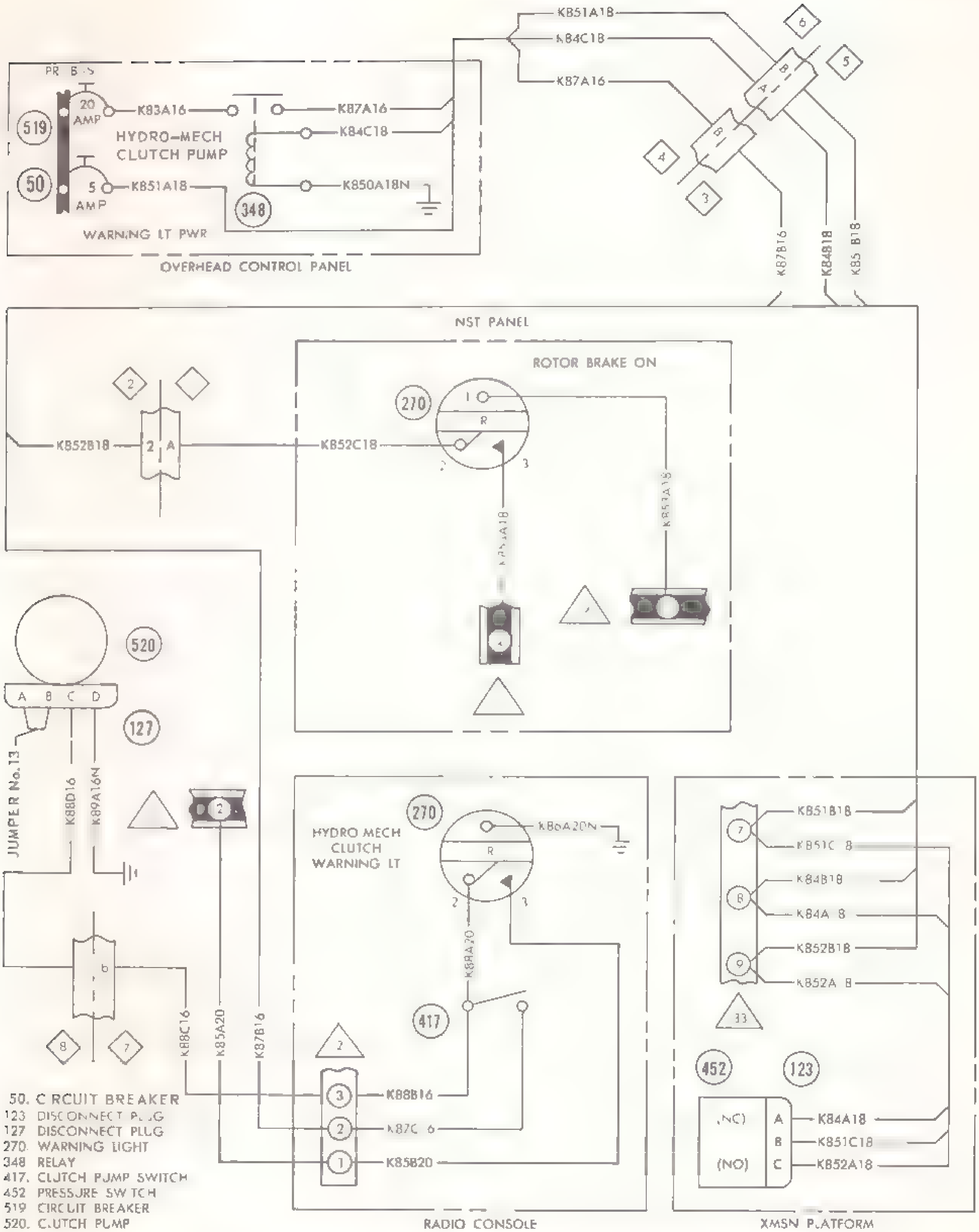
50. CIRCUIT BREAKER
47. CIRCUIT BREAKER
123. DISCONNECT PLUG
127. DISCONNECT PLUG
270. WARNING LIGHT
304. CLUTCH PUMP
348. RELAY
417. CLUTCH PUMP SWITCH
452. PRESSURE SWITCH

Figure 12—60. Hydro-mechanical clutch pump (model CH-34A serial No. 55-4462 through 55-4504)



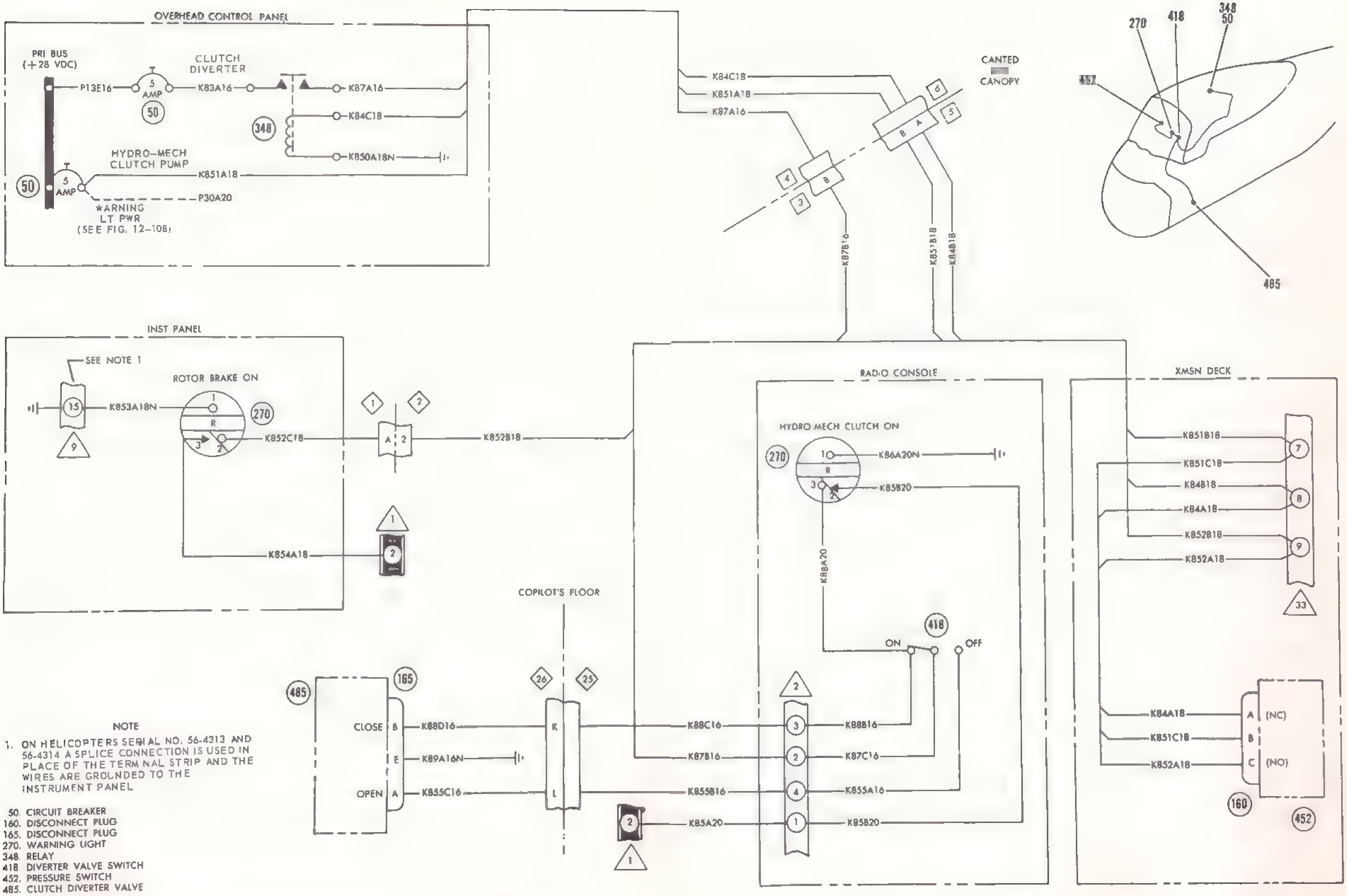
50. CIRCUIT BREAKER
51. CIRCUIT BREAKER
198. DISCONNECT PLUG
199. DISCONNECT PLUG
270. WARNING LIGHT
303. CLUTCH PUMP
348. RELAY
417. CLUTCH PUMP SWITCH
452. PRESSURE SWITCH
472. TERMINAL BLOCK

Figure 12–61. Hydro-mechanical clutch pump (model CH-34A serial No. 56-4284 through 56-4312)



50. CIRCUIT BREAKER
123 DISCONNECT PLUG
127 DISCONNECT PLUG
270. WARNING LIGHT
348 RELAY
417. CLUTCH PUMP SWITCH
452 PRESSURE SWITCH
519 CIRCUIT BREAKER
520. CLUTCH PUMP

Figure 12—62. Hydro-mechanical clutch pump (model CH-34C serial No. prior to 56-4313)



NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL

50. CIRCUIT BREAKER
160. DISCONNECT PLUG
165. DISCONNECT PLUG
270. WARNING LIGHT
348. RELAY
418. DIVERTER VALVE SWITCH
452. PRESSURE SWITCH
485. CLUTCH DIVERTER VALVE

Figure 12–63. Clutch diverter valve (helicopters serial No. 56-4313 and subsequent)

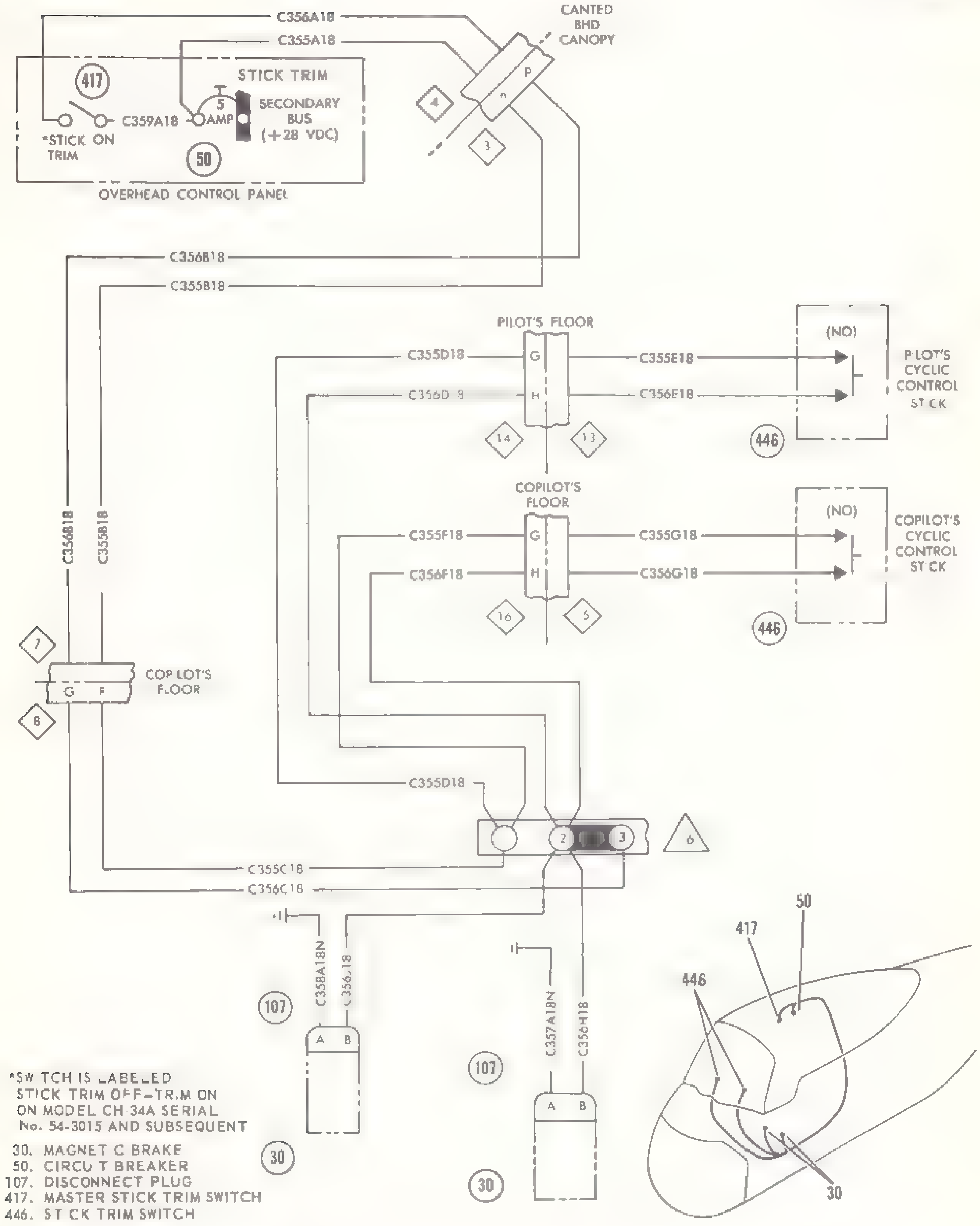
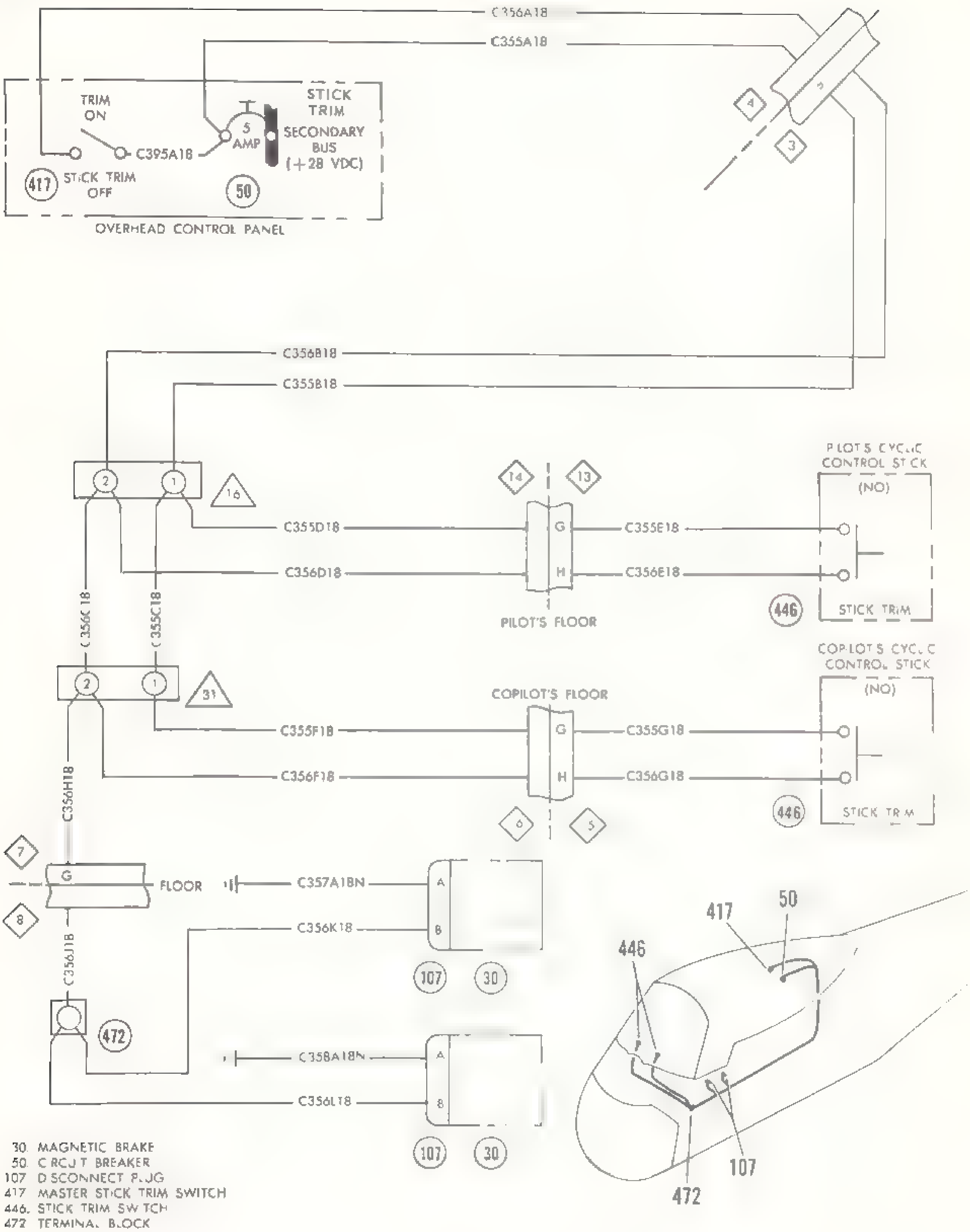
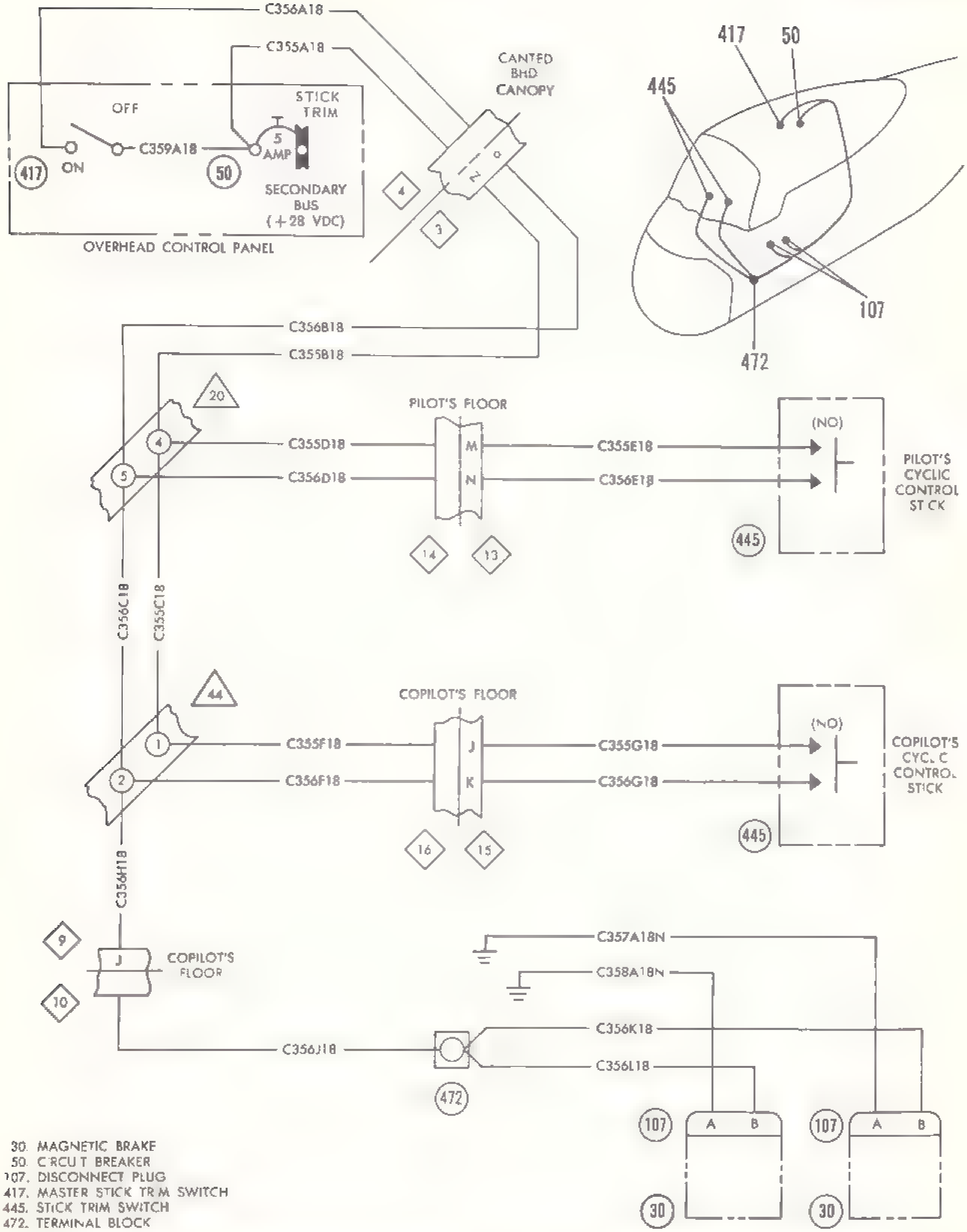


Figure 12—64. Stick trim (model CH-34A serial No. prior to 55-4497)



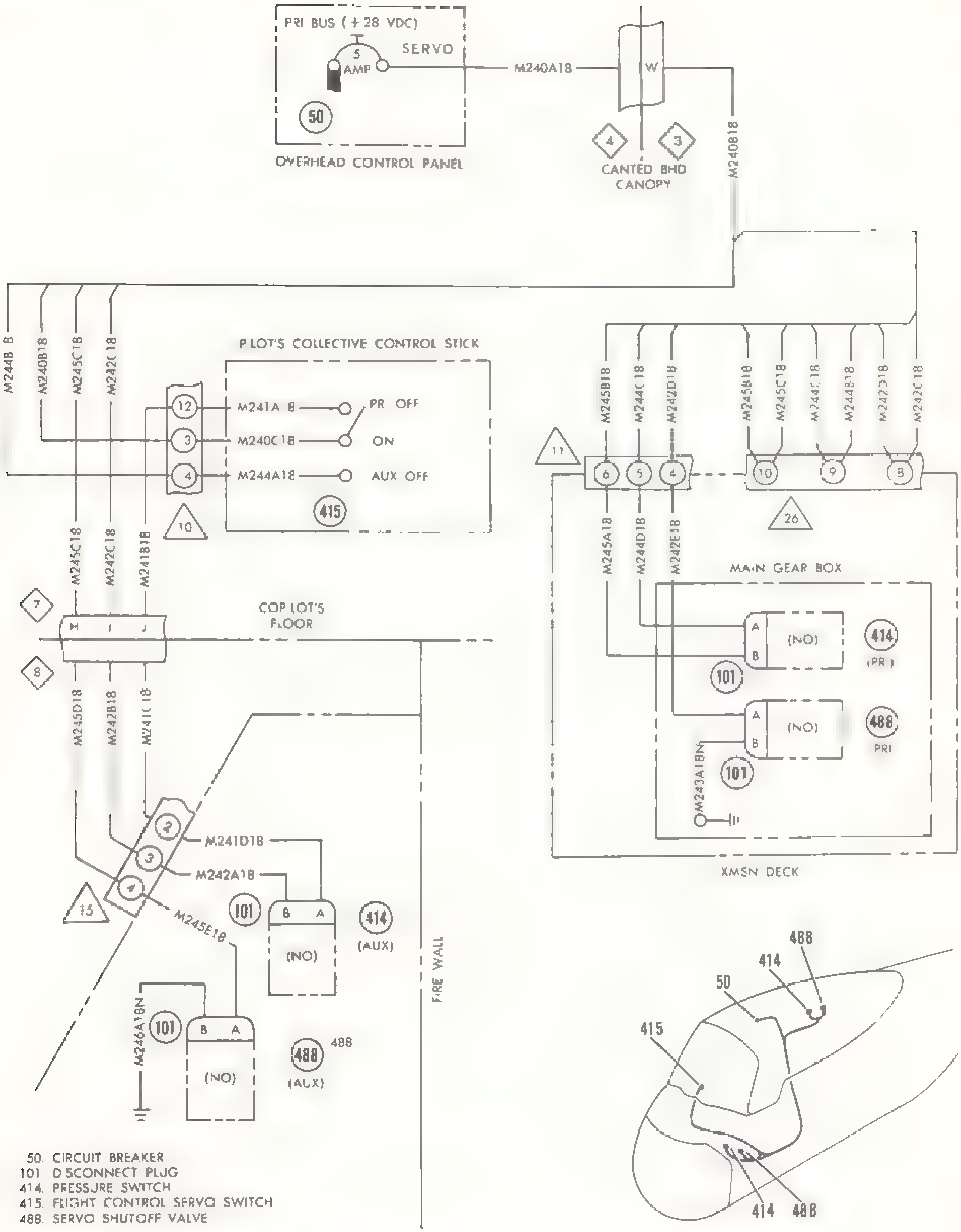
30. MAGNETIC BRAKE
50. CIRCUIT BREAKER
107. DISCONNECT PLUG
417. MASTER STICK TRIM SWITCH
446. STICK TRIM SWITCH
472. TERMINAL BLOCK

Figure 12–65. Stick trim (model CH 34A serial No. 55 4497 through 56-4312)



30. MAGNETIC BRAKE
50. CIRCUIT BREAKER
107. DISCONNECT PLUG
417. MASTER STICK TRIM SWITCH
445. STICK TRIM SWITCH
472. TERMINAL BLOCK

Figure 12—66. Stick trim (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



50. CIRCUIT BREAKER
101. DISCONNECT PLUG
414. PRESSURE SWITCH
415. FLIGHT CONTROL SERVO SWITCH
488. SERVO SHUTOFF VALVE

Figure 12–67. Primary and auxiliary servo (model CH-34A serial No. prior to 56-4313)

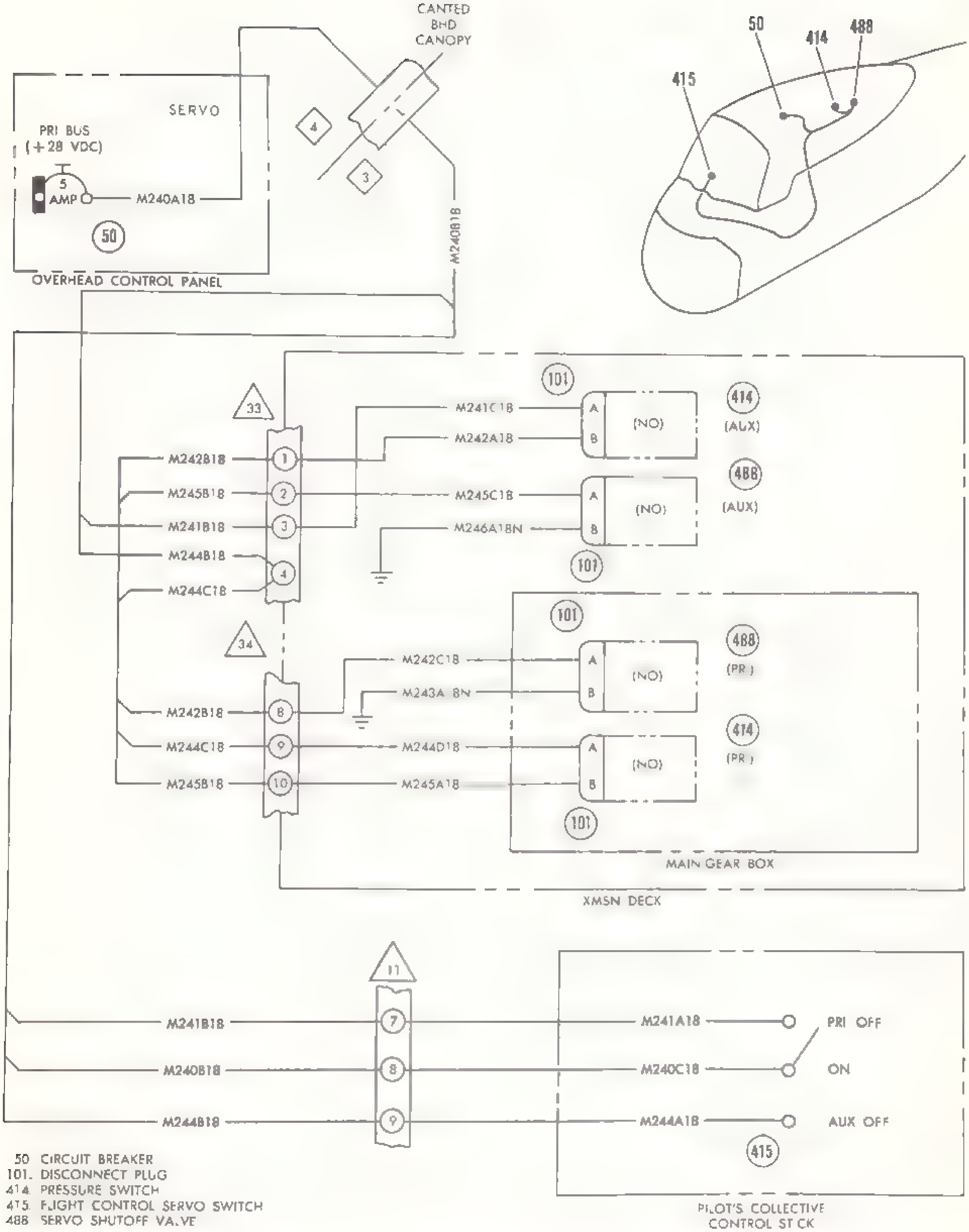
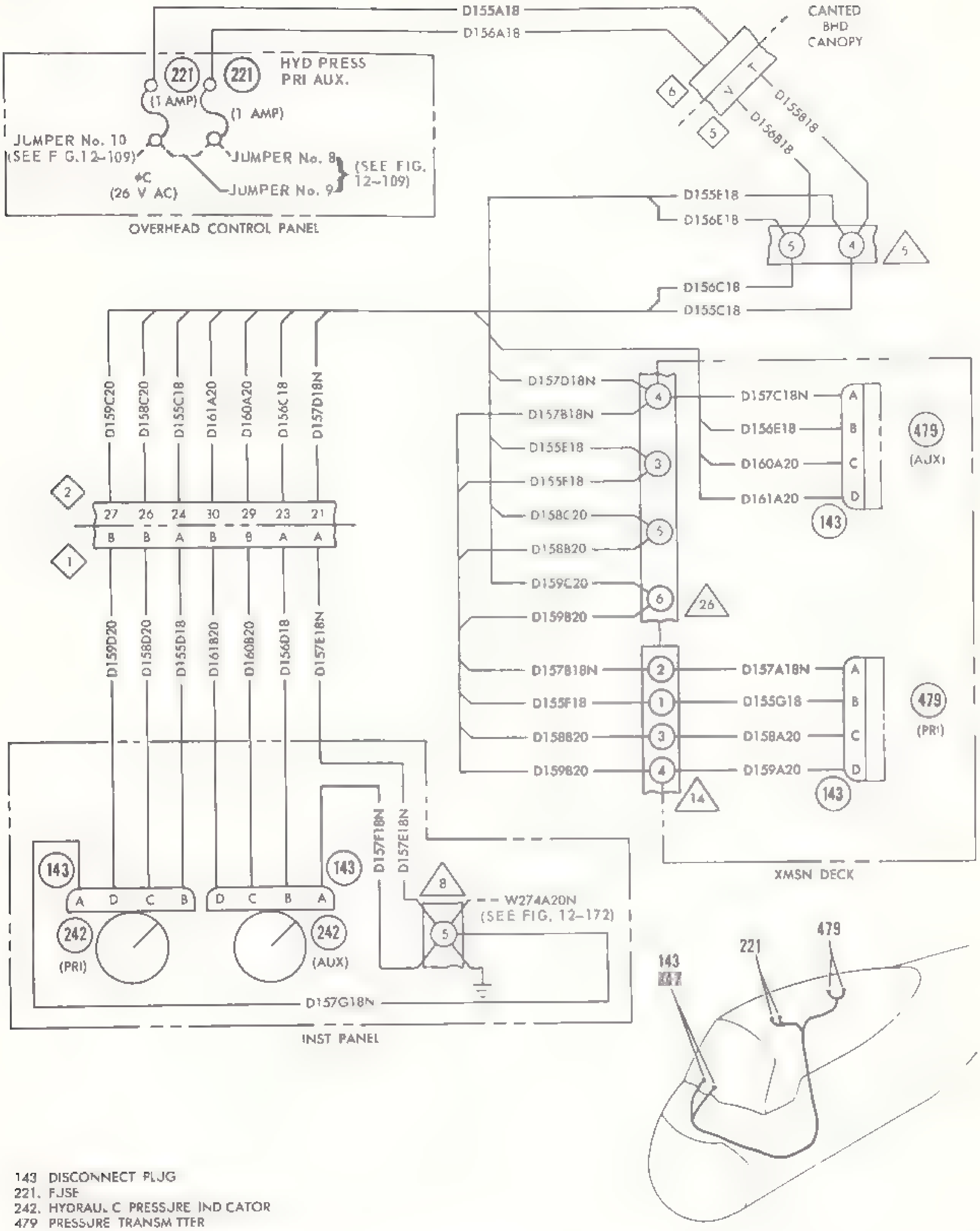
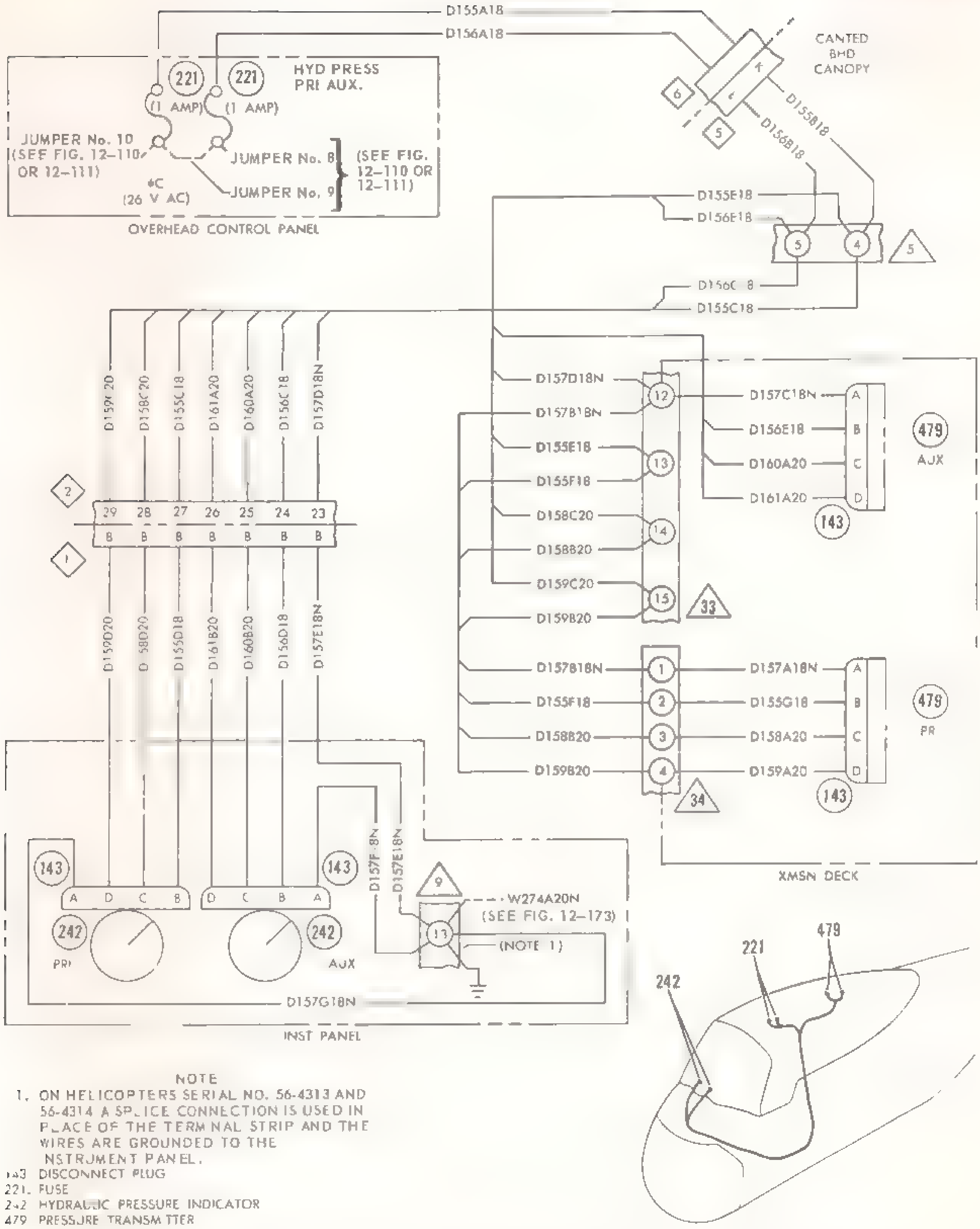


Figure 12—68. Primary and auxiliary servo (model CH 34A serial No. 56-4313 through 57-1741 and model CH-34C)



143 DISCONNECT PLUG
221. FUSE
242. HYDRAULIC PRESSURE INDICATOR
479 PRESSURE TRANSMITTER

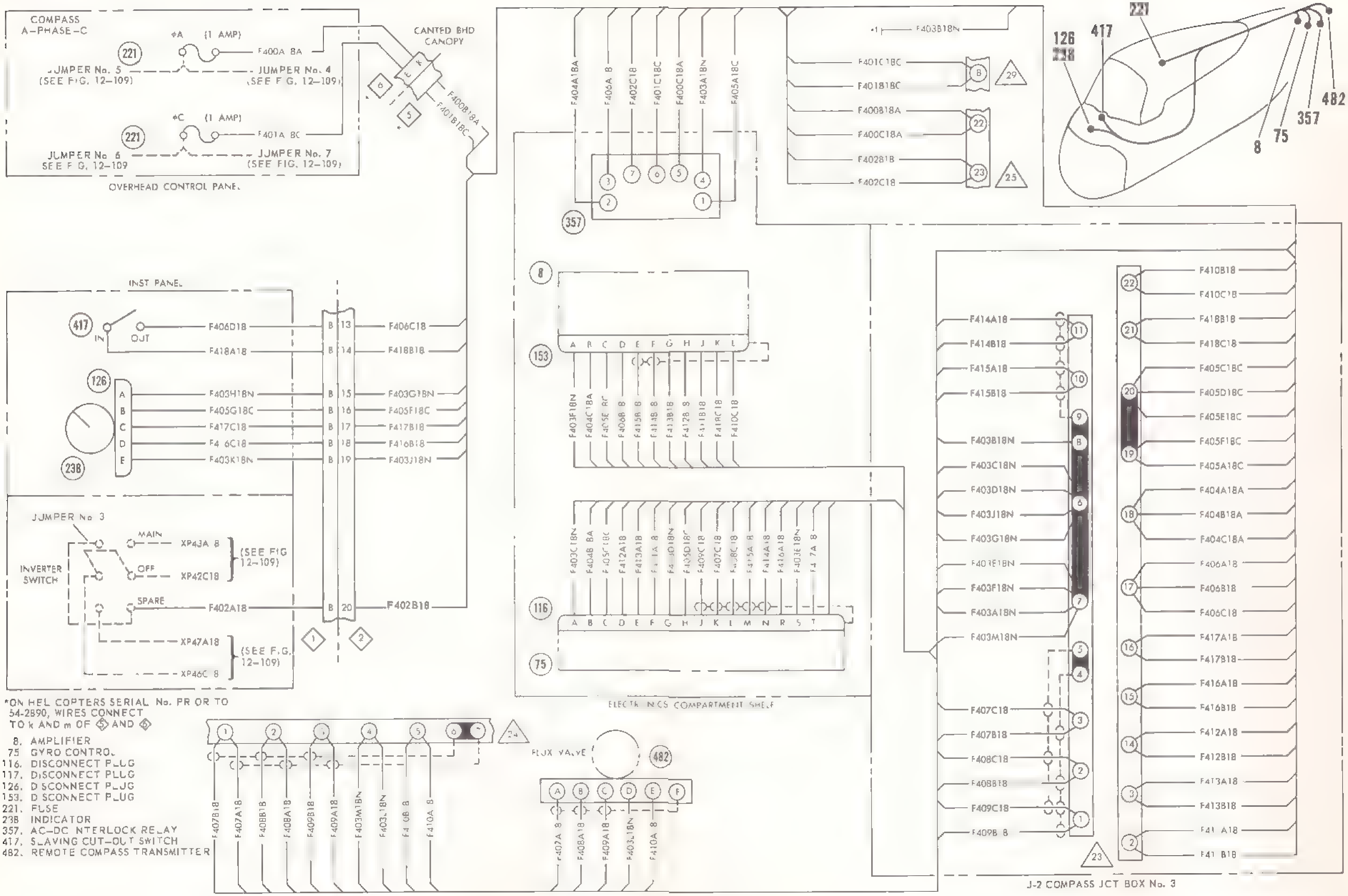
Figure 12—69. Primary and auxiliary hydraulic pressure indicator (model CH-34A serial No. prior to 56 4313)



NOTE
1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

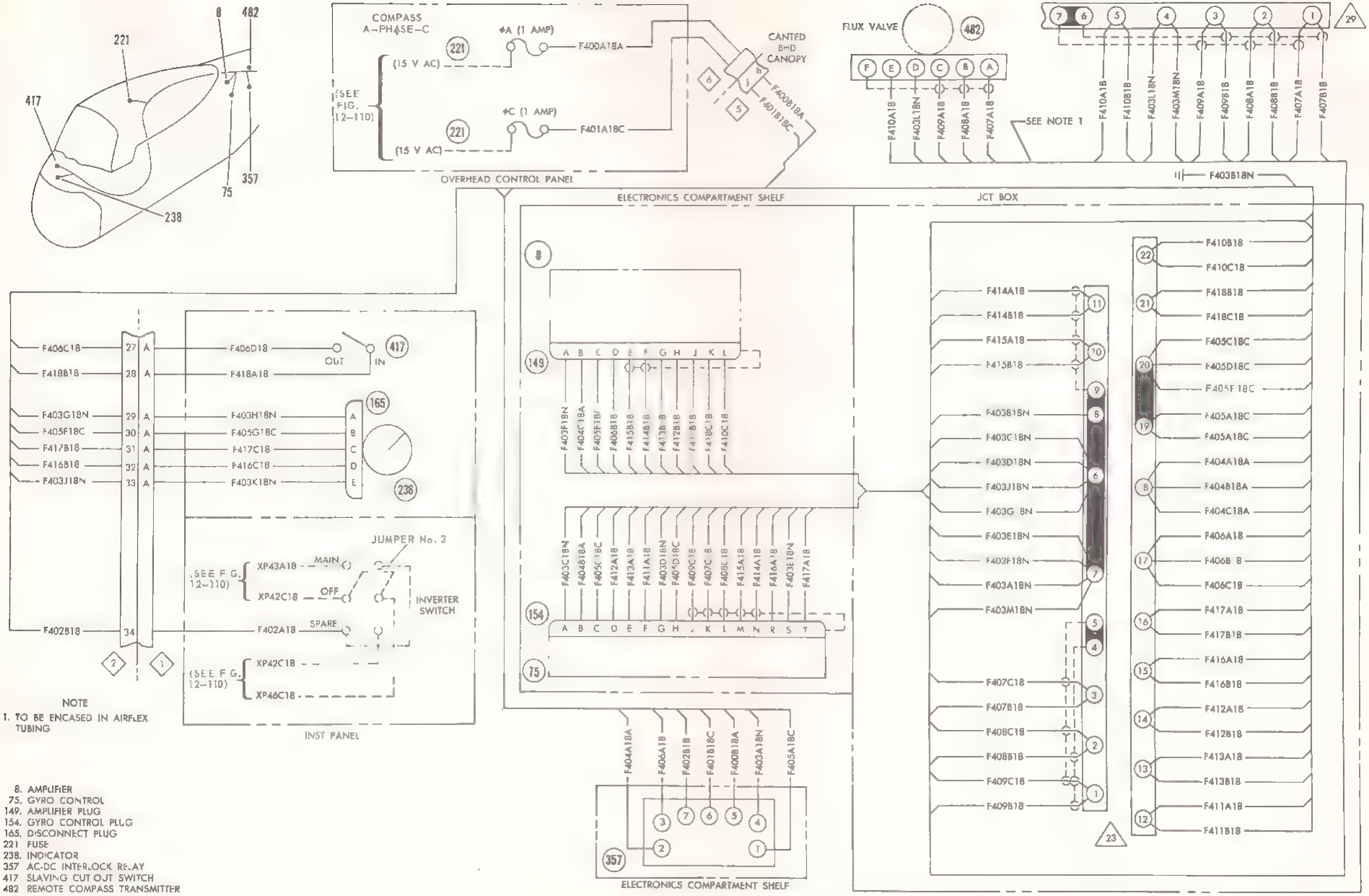
143 DISCONNECT PLUG
221. FUSE
242 HYDRAULIC PRESSURE INDICATOR
479 PRESSURE TRANSMITTER

Figure 12–70. Primary and auxiliary hydraulic pressure indicator (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



8. AMPLIFIER
75. GYRO CONTROL
116. DISCONNECT PLUG
117. DISCONNECT PLUG
126. DISCONNECT PLUG
153. DISCONNECT PLUG
221. FUSE
238. INDICATOR
357. AC-DC INTERLOCK RELAY
417. SLAVING CUT-OUT SWITCH
482. REMOTE COMPASS TRANSMITTER

Figure 12–71. J-2 gyro compass (model CH-34A serial No. prior to 56-4313)



8. AMPLIFIER
75. GYRO CONTROL
149. AMPLIFIER PLUG
154. GYRO CONTROL PLUG
165. DISCONNECT PLUG
221 FUSE
238. INDICATOR
357 AC-DC INTERLOCK RELAY
417 SLAVING CUT OUT SWITCH
482 REMOTE COMPASS TRANSMITTER

Figure 12–72. J 2 gyro compass (model CH-34A serial No. 56-4313 through 56-4342)

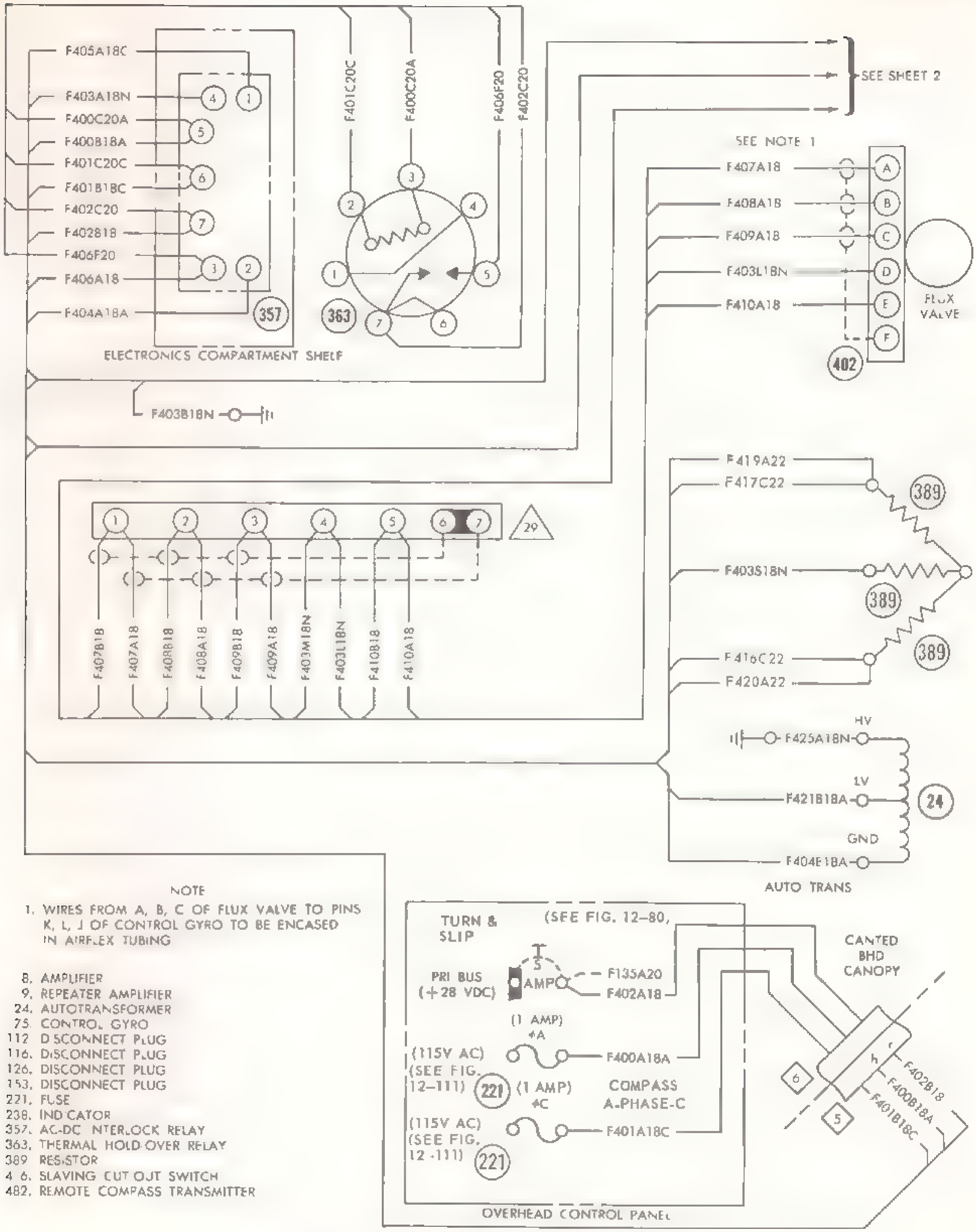


Figure 12–74. J-2 gyro compass (model CH 34C) (Sheet 1 of 2)

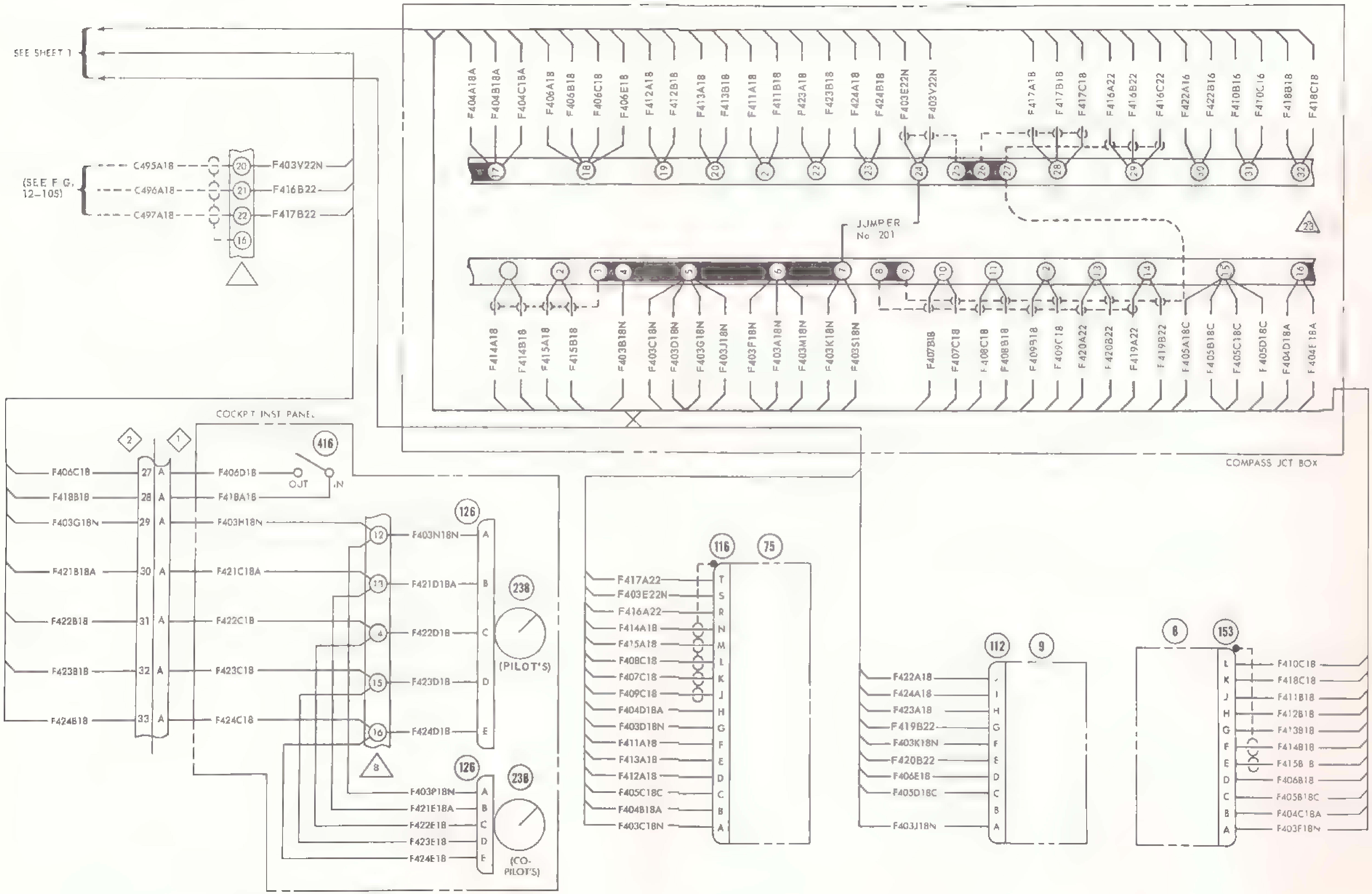
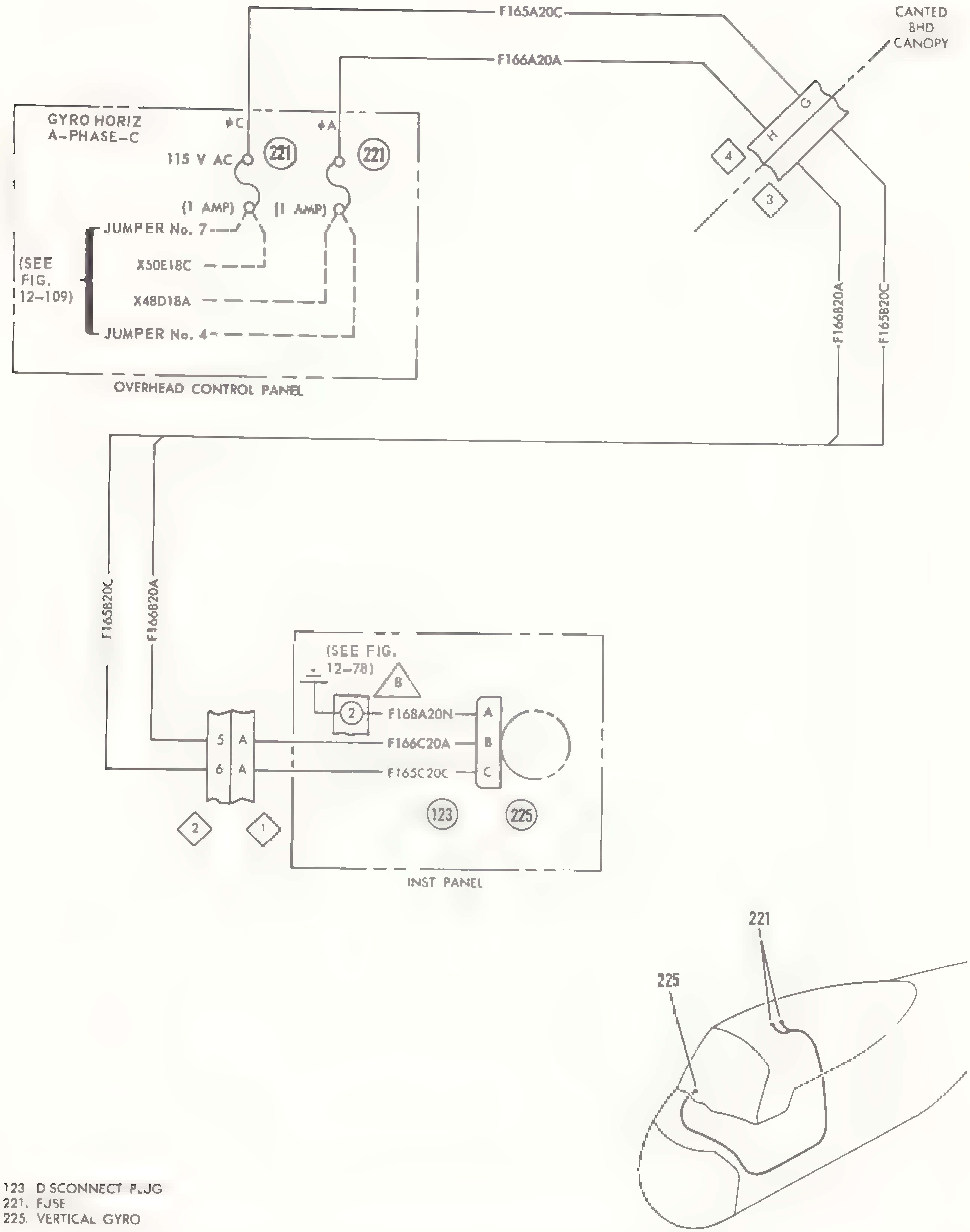
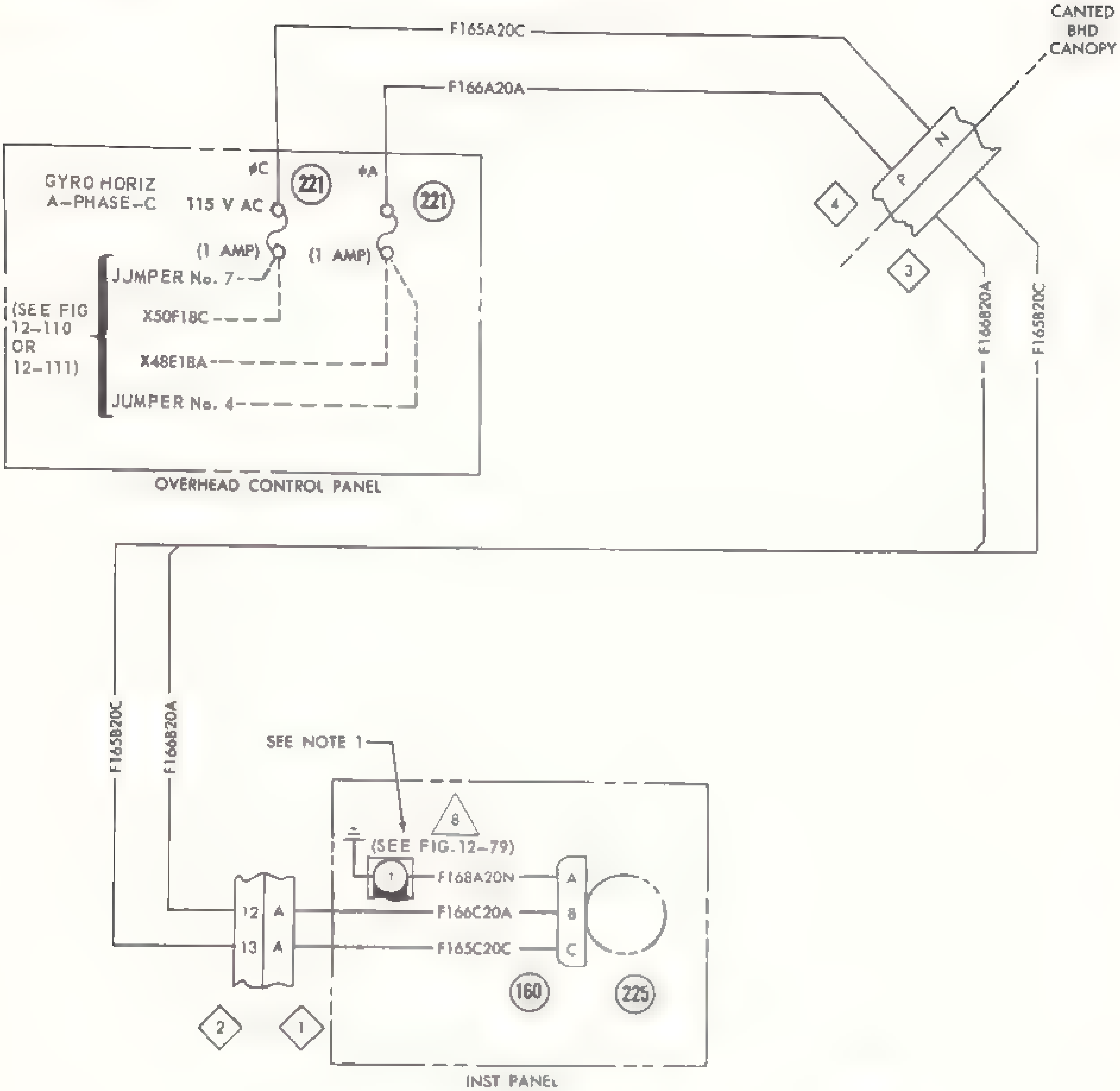


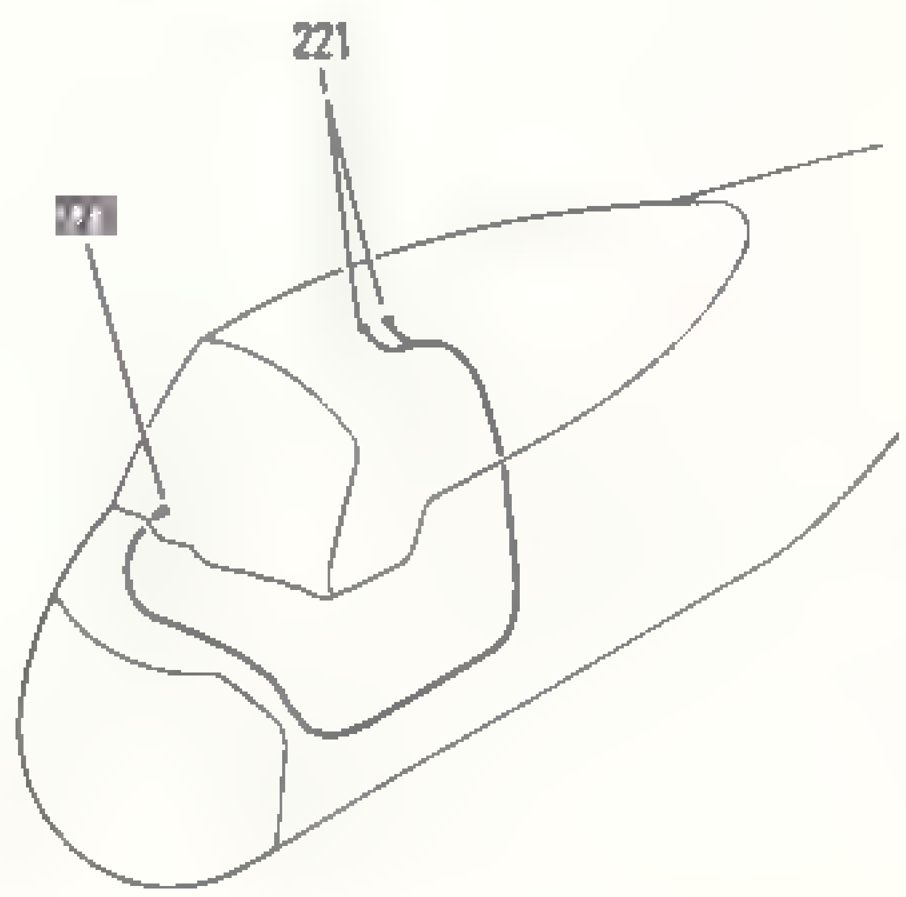
Figure 12–74. J-2 gyro compass (model CH-34C) (Sheet 2 of 2)



123 DISCONNECT PLUG
221. FUSE
225. VERTICAL GYRO

Figure 12–75. J-8 vertical gyro (model CH-34A serial No. prior to 56-4313)



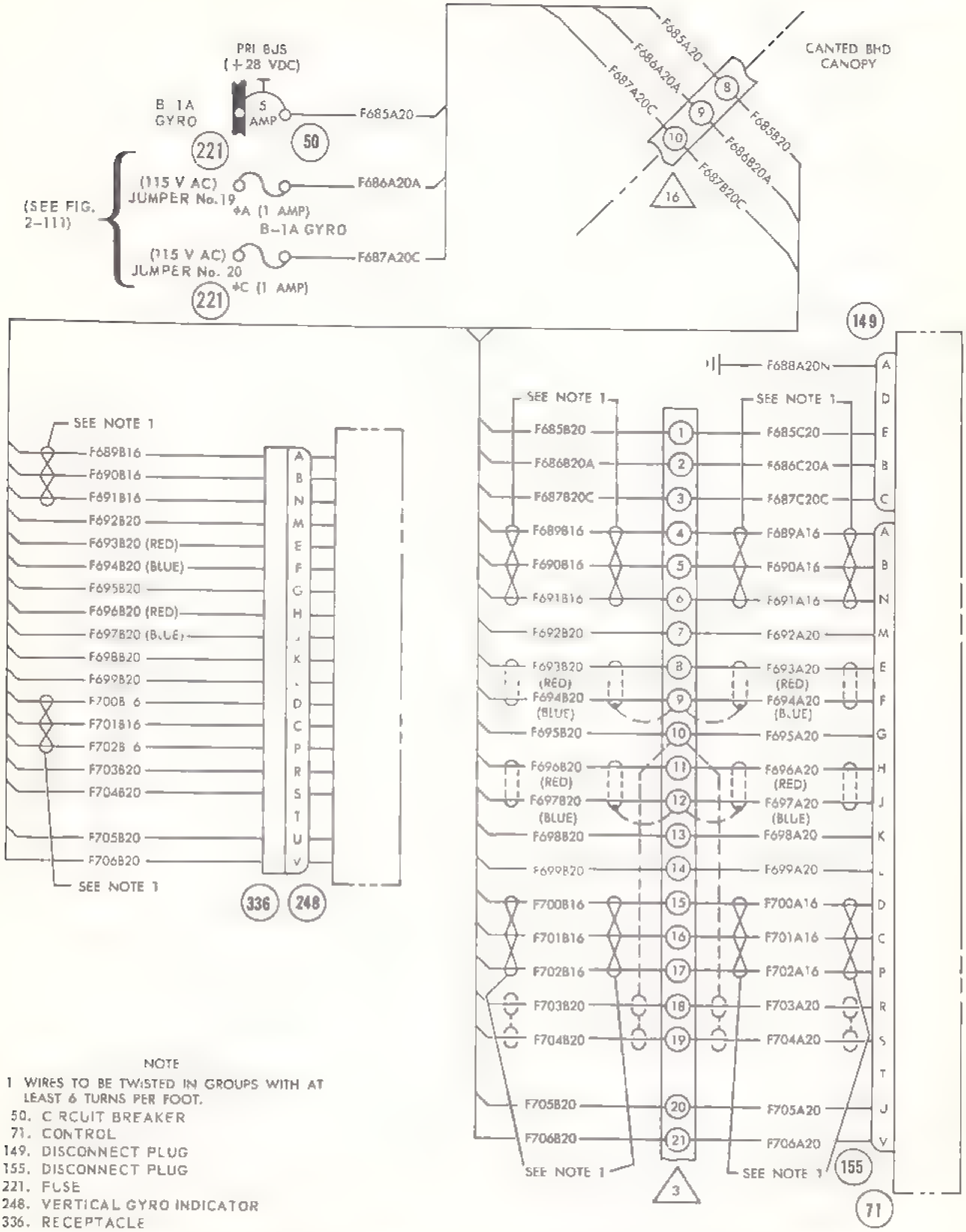


NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

160. DISCONNECT PLUG
221. FUSE
225. VERTICAL GYRO

Figure 12-76. J-8 vertical gyro (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)

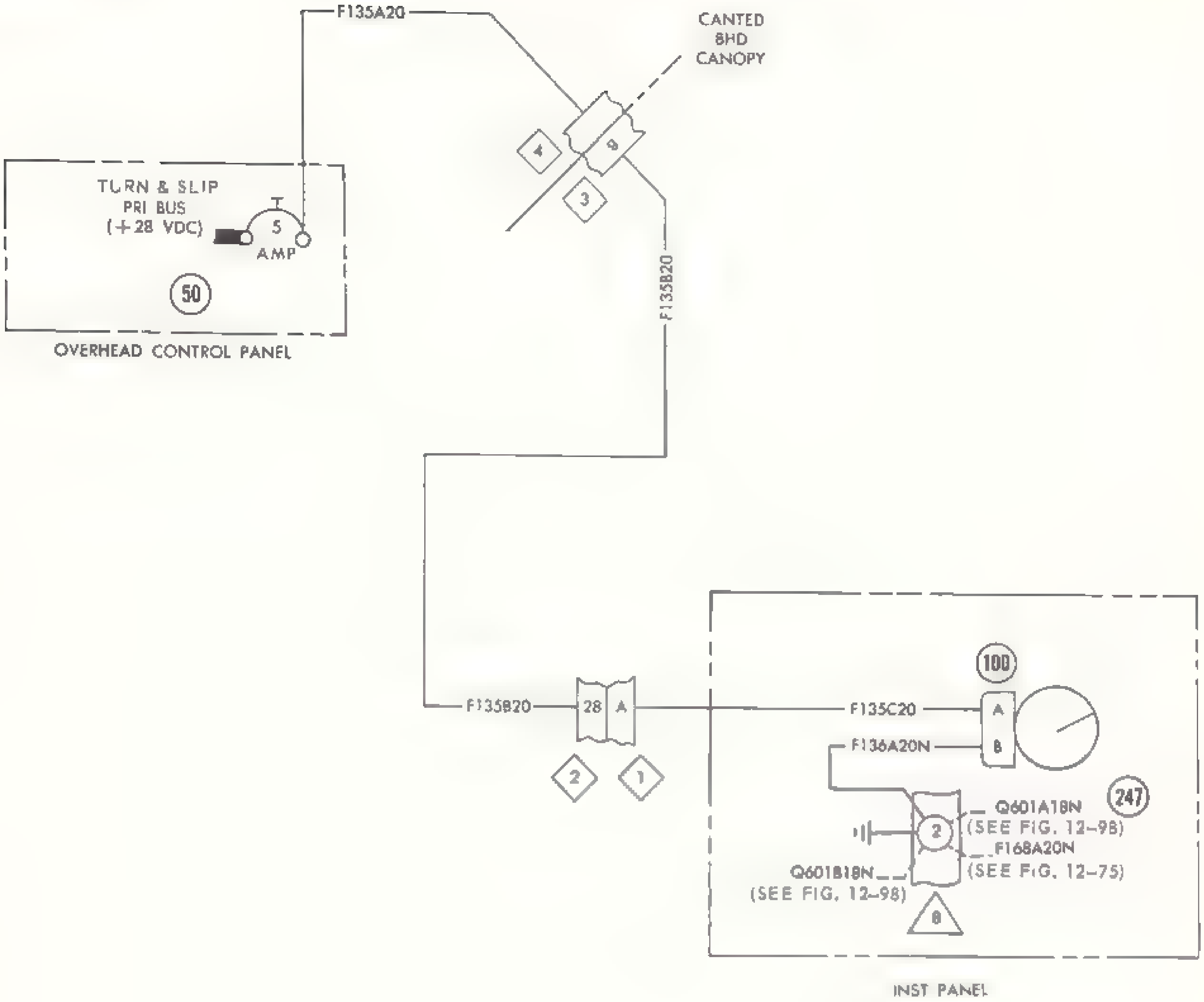


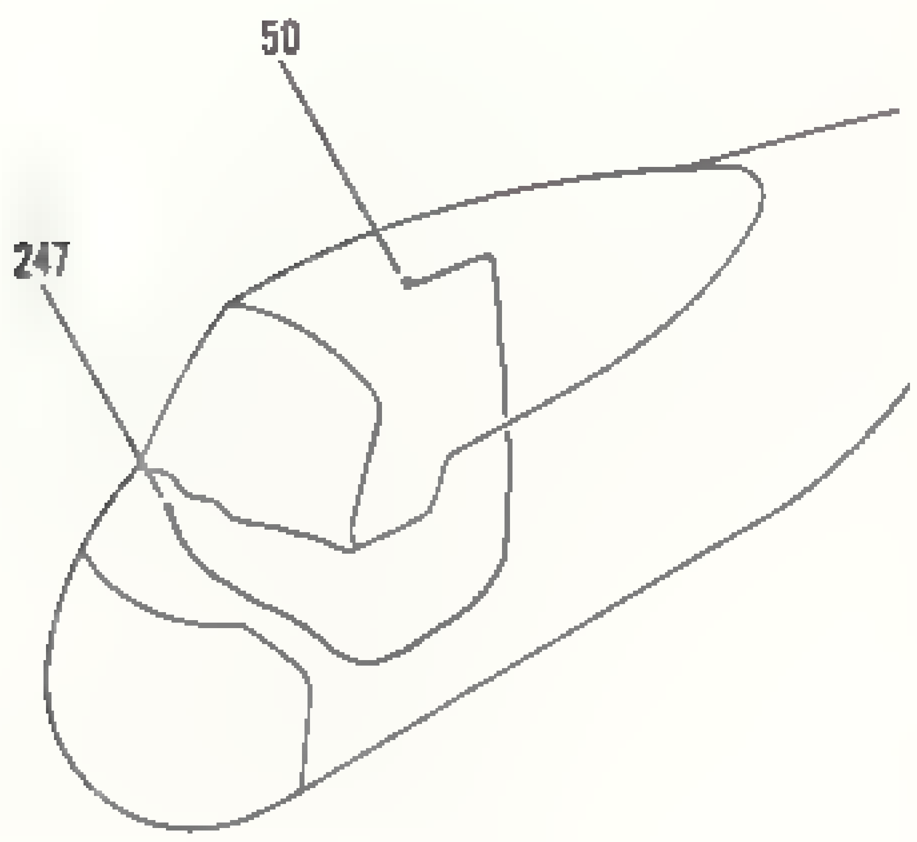
NOTE

1 WIRES TO BE TWISTED IN GROUPS WITH AT LEAST 6 TURNS PER FOOT.

50. CIRCUIT BREAKER
71. CONTROL
149. DISCONNECT PLUG
155. DISCONNECT PLUG
221. FUSE
248. VERTICAL GYRO INDICATOR
336. RECEPTACLE

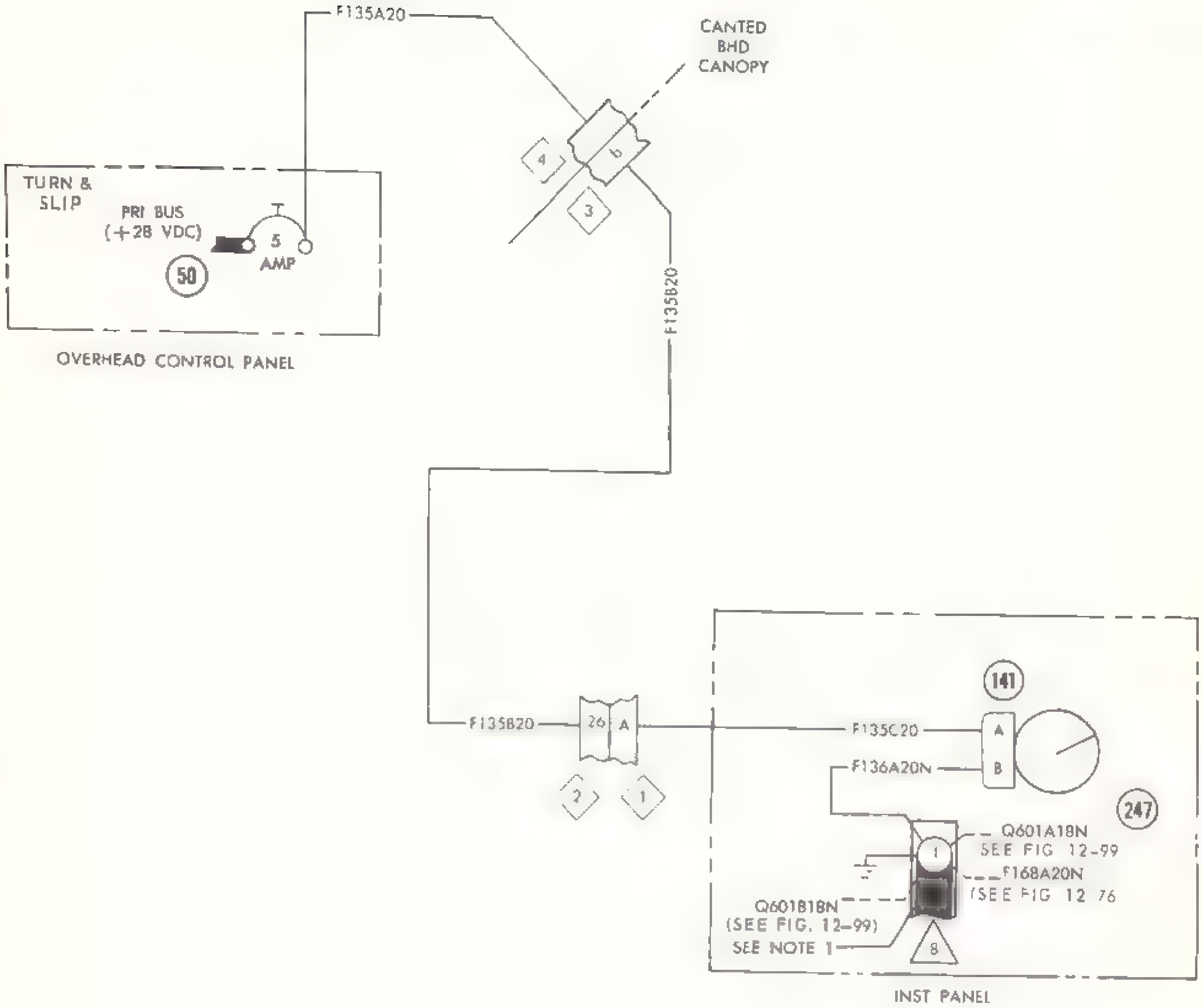
Figure 12–77. Vertical gyro indicator-type B-1A (model CH-34C serial No. 57-1742 and subsequent)

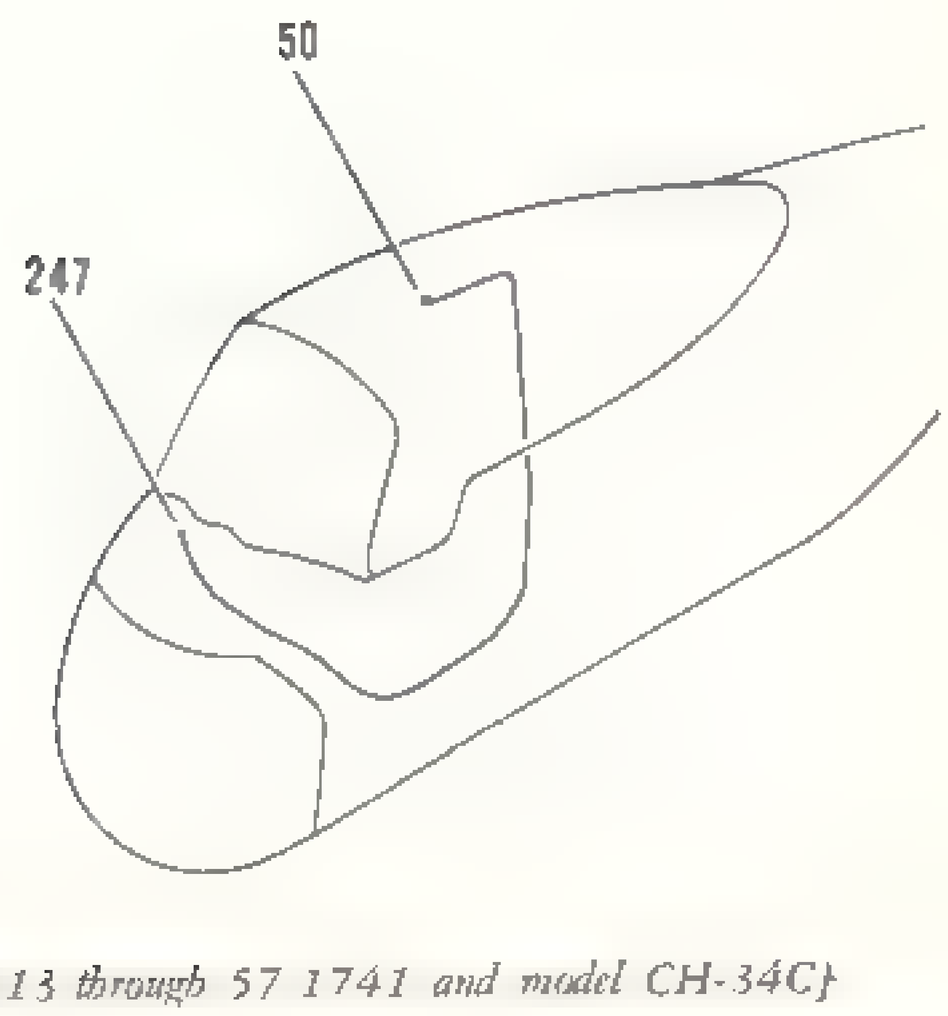




50. CIRCUIT BREAKER
100. DISCONNECT PLUG
247. TURN-AND-SLIP INDICATOR

Figure 12–78. Turn-and-slip indicator (model CH 34A serial No. prior to 56-4313)



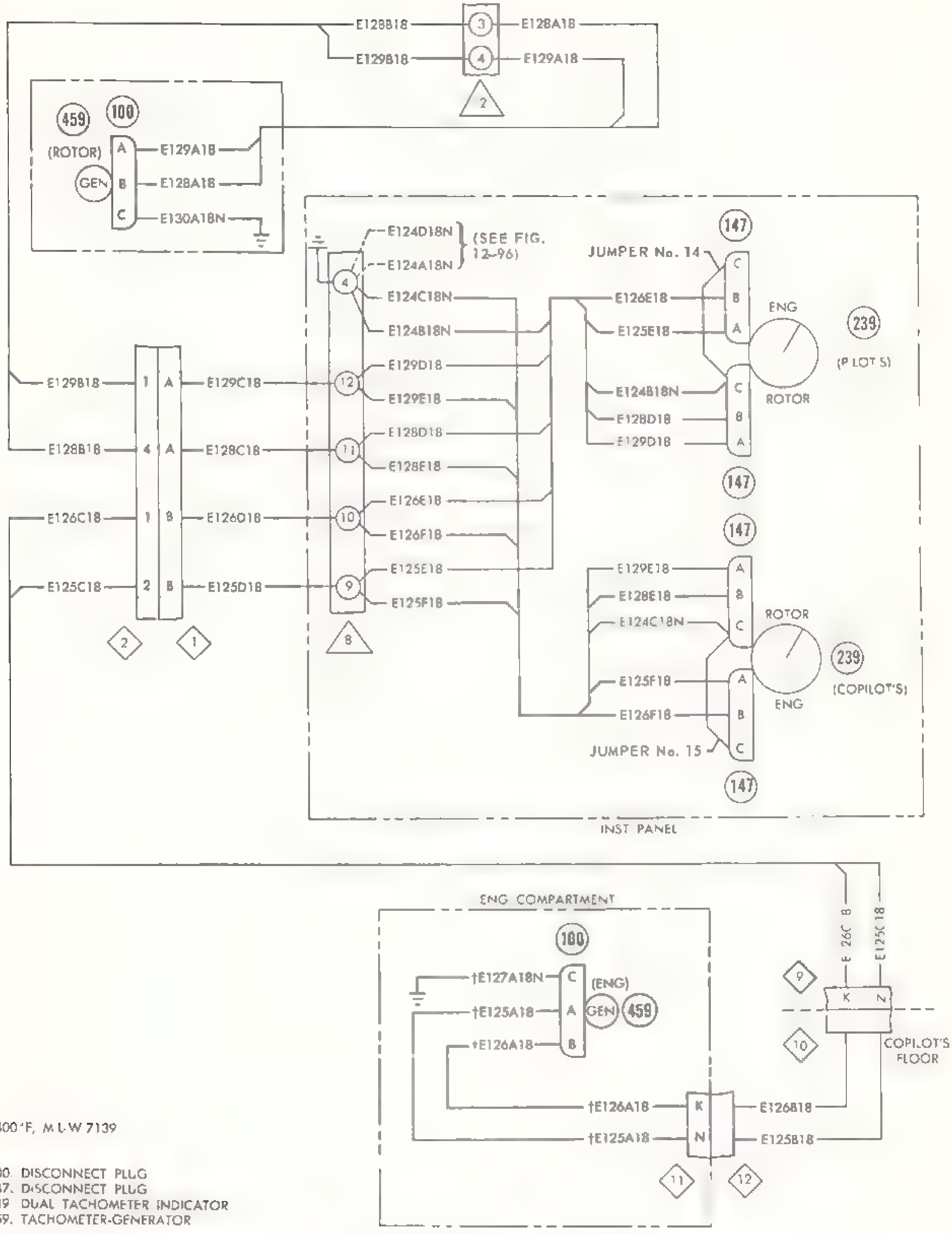


NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL

50. CIRCUIT BREAKER
141. DISCONNECT PLUG
247. TURN-AND-SLIP INDICATOR

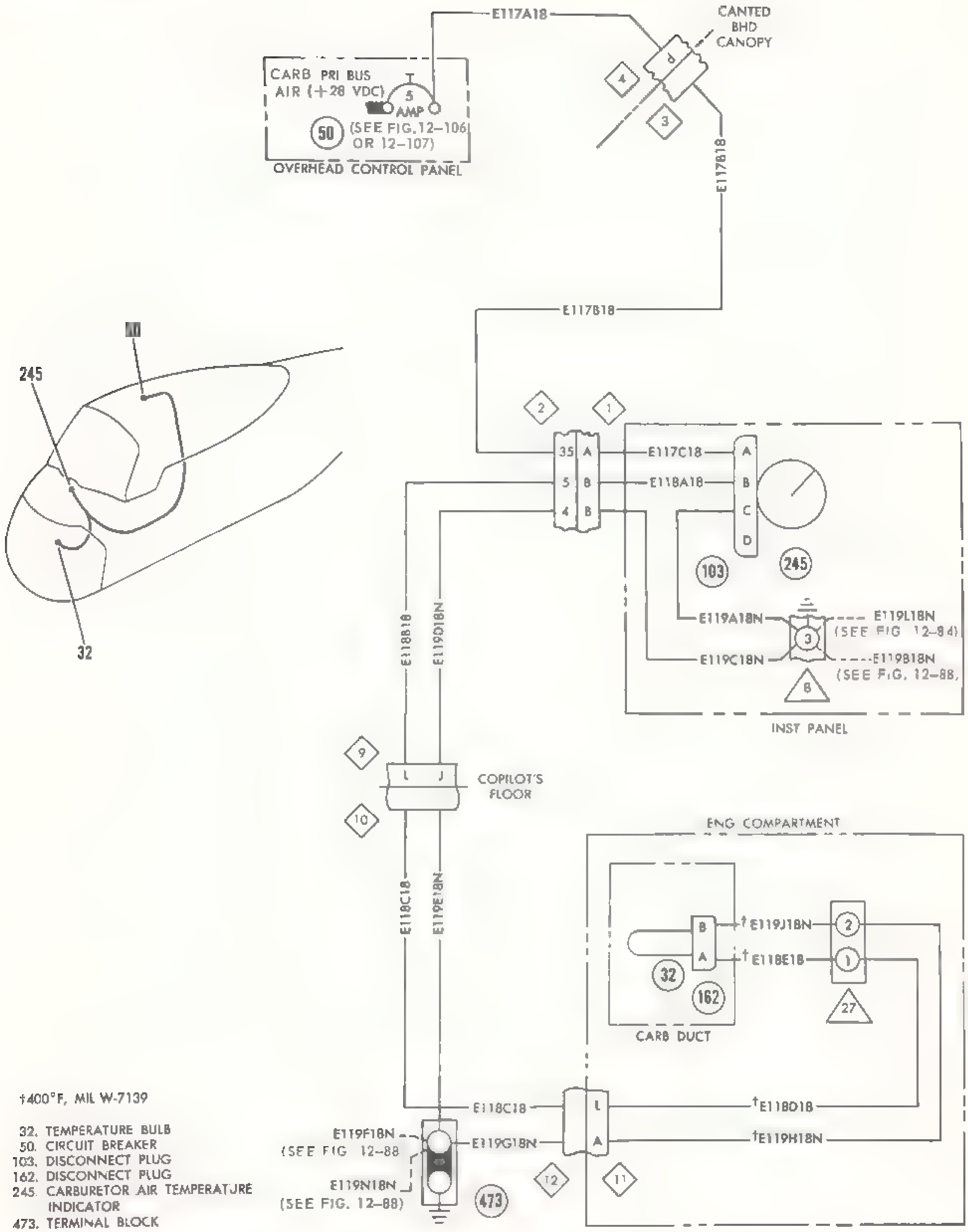
Figure 12–79 Turn-and slip indicator (model CH 34A serial No 56 4313 through 57 1741 and model CH-34C)



+400°F, MIL-W 7139

100. DISCONNECT PLUG
147. DISCONNECT PLUG
239. DUAL TACHOMETER INDICATOR
459. TACHOMETER-GENERATOR

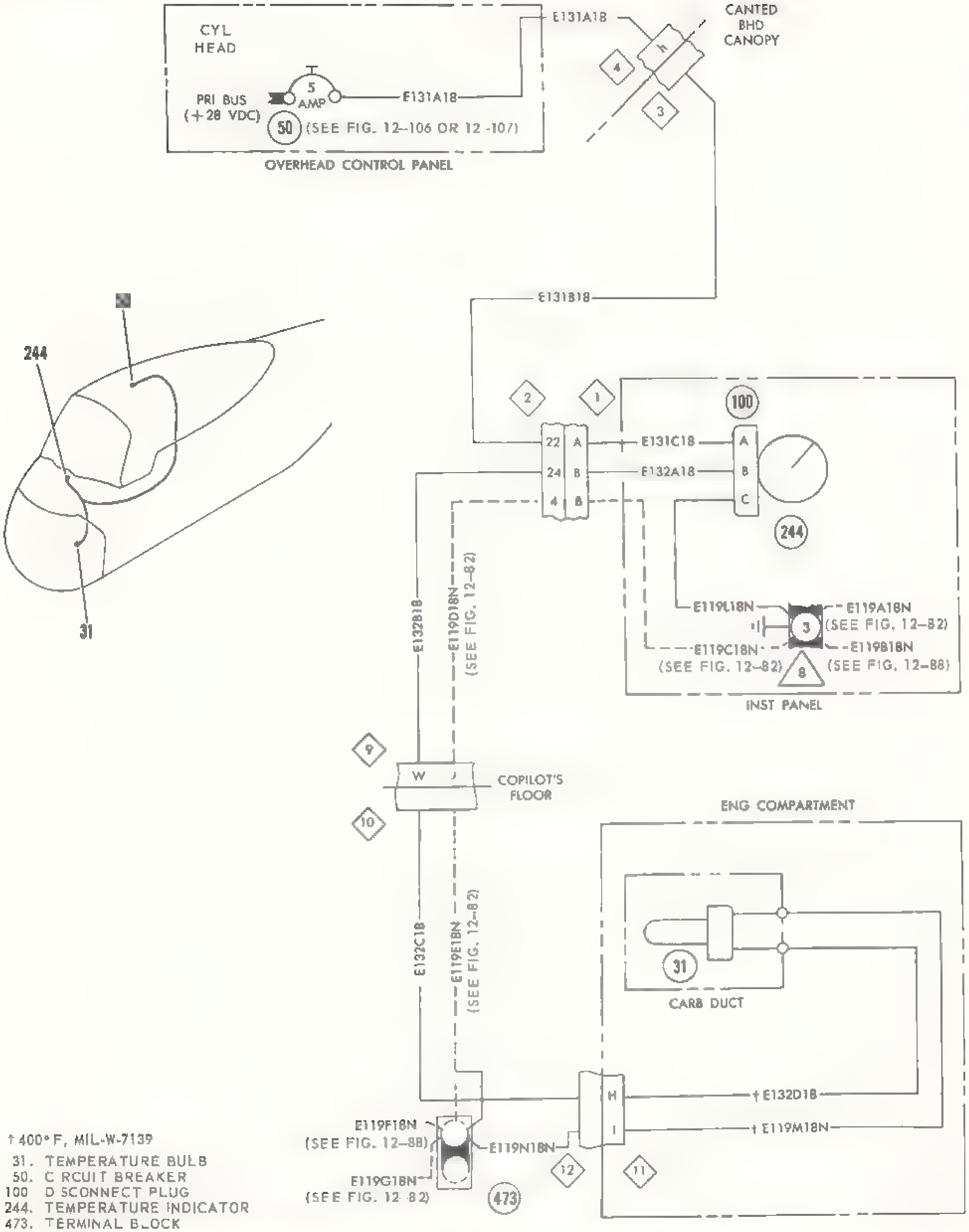
Figure 12–80. Dual tachometer indicator (model CH-34A serial No. prior to 56-4313)



†400°F, MIL W-7139

32. TEMPERATURE BULB
50. CIRCUIT BREAKER
103. DISCONNECT PLUG
162. DISCONNECT PLUG
245. CARBURETOR AIR TEMPERATURE INDICATOR
473. TERMINAL BLOCK

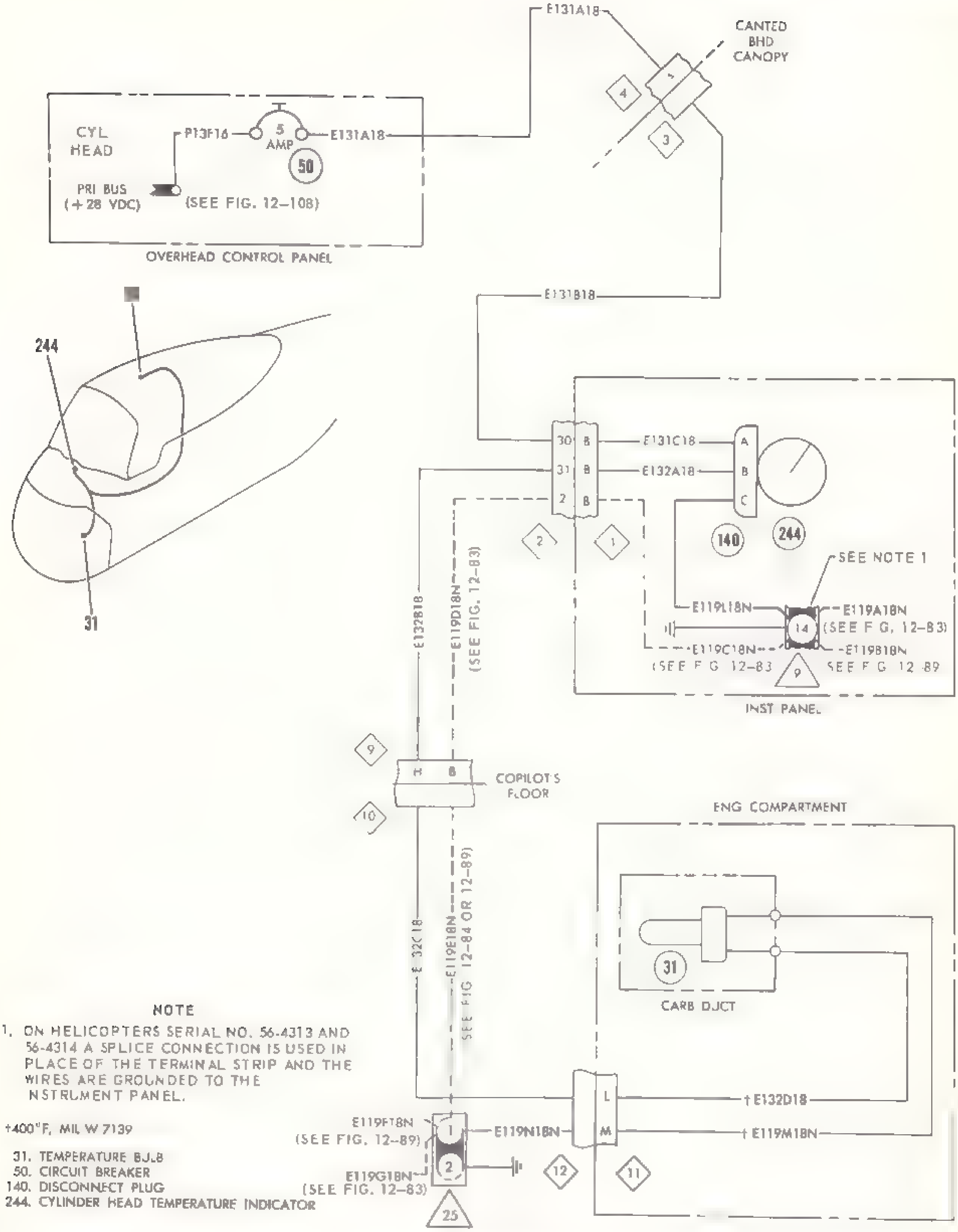
Figure 12–82. Carburetor air temperature indicator (model CH-34A serial No. prior to 56-4313)



† 400° F, MIL-W-7139

31. TEMPERATURE BULB
50. CIRCUIT BREAKER
100 DISCONNECT PLUG
244. TEMPERATURE INDICATOR
473. TERMINAL BLOCK

Figure 12–84. Cylinder head temperature indicator (model CH 34A serial No. prior to 56-4313)



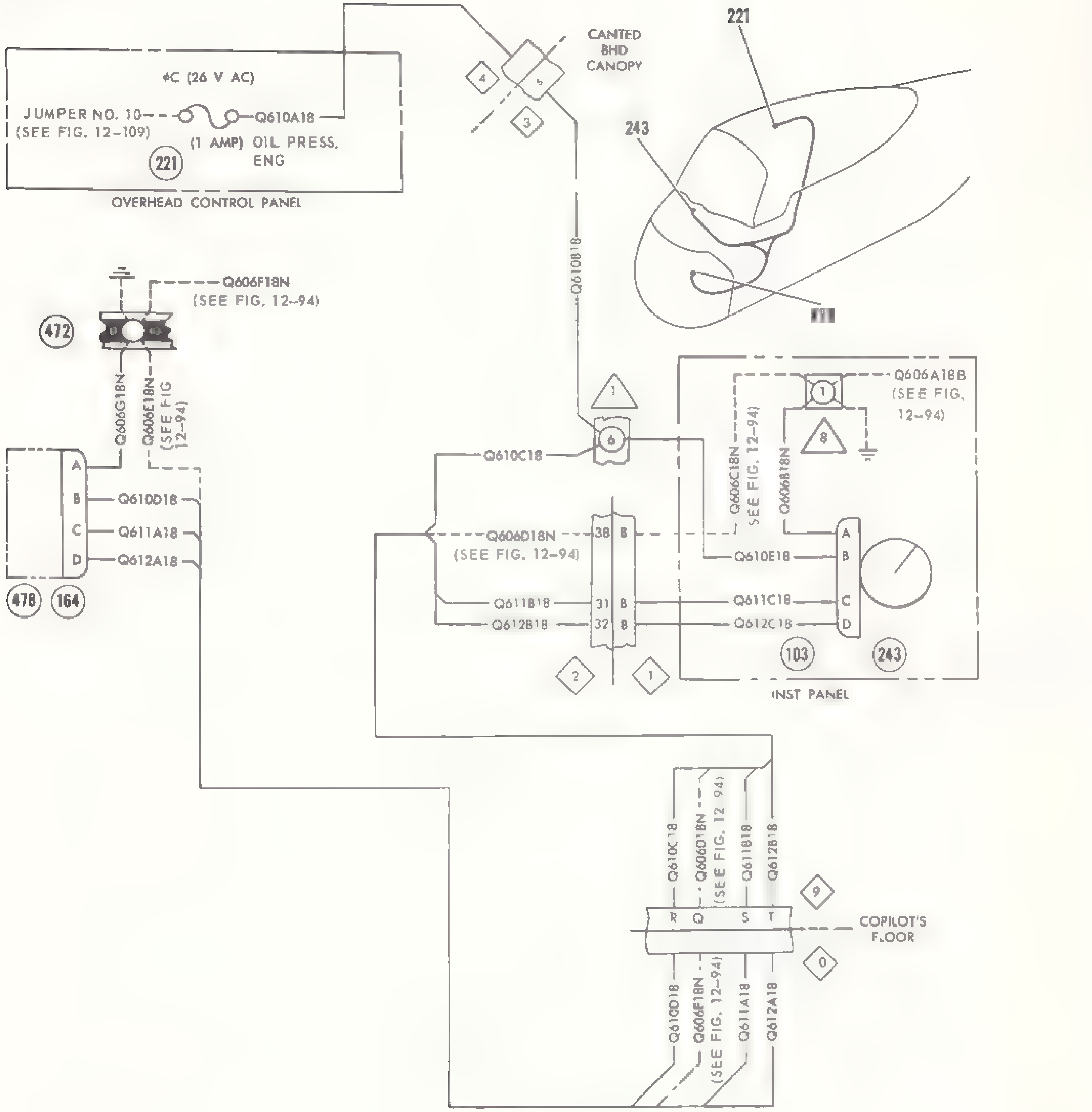
NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

†400°F, MIL W 7139

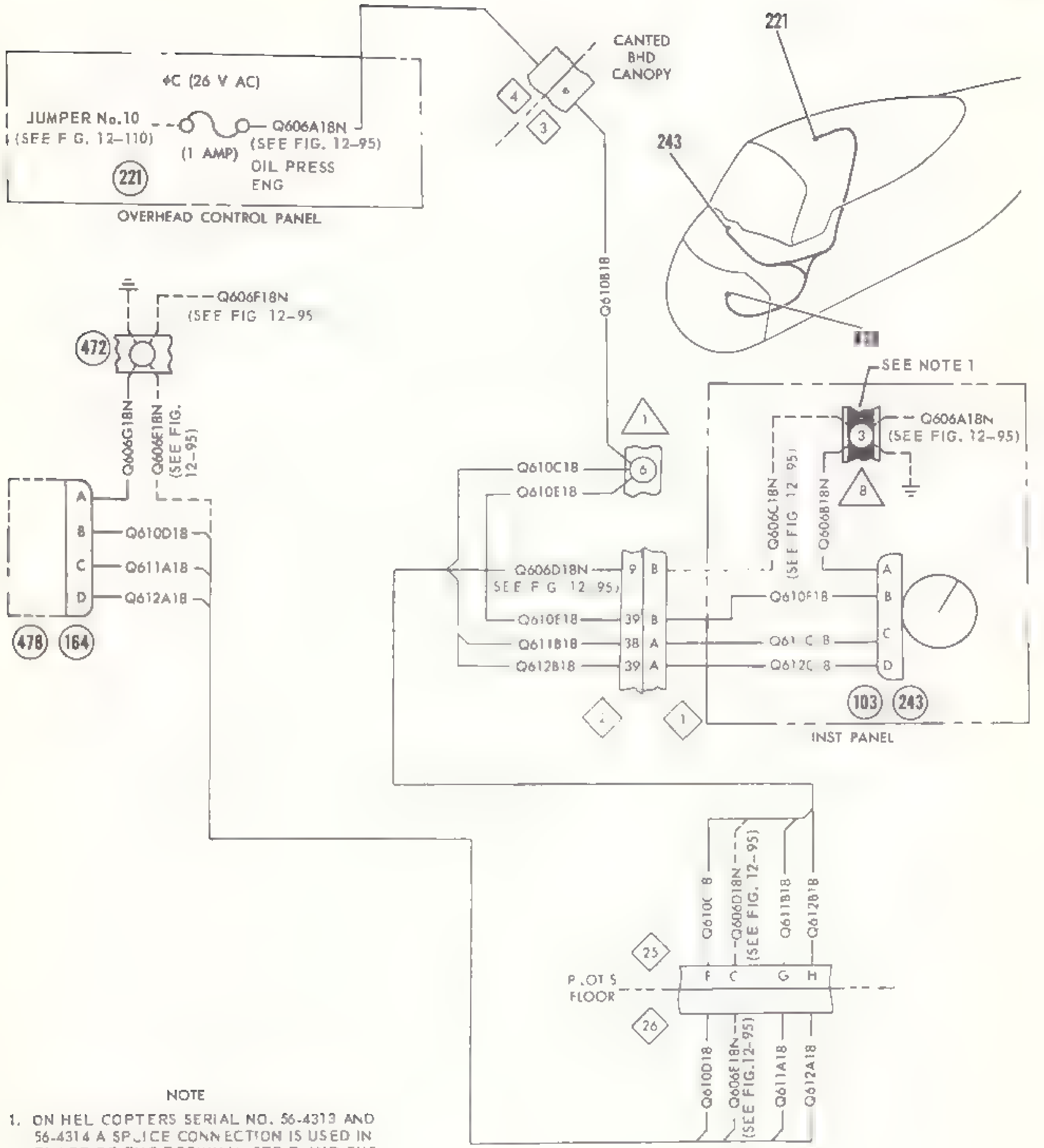
31. TEMPERATURE BULB
50. CIRCUIT BREAKER
140. DISCONNECT PLUG
244. CYLINDER HEAD TEMPERATURE INDICATOR

Figure 12—85. Cylinder head temperature indicator (model CH-34A serial No. 56-4313 through 57 1741 and model CH-34C)



103. DISCONNECT PLUG
164. DISCONNECT PLUG
221. FUSE
243. ENGINE OIL PRESSURE INDICATOR
478. ENGINE OIL PRESSURE TRANSMITTER

Figure 12—86. Engine oil pressure indicator (model CH-34A serial No. prior to 56-4313

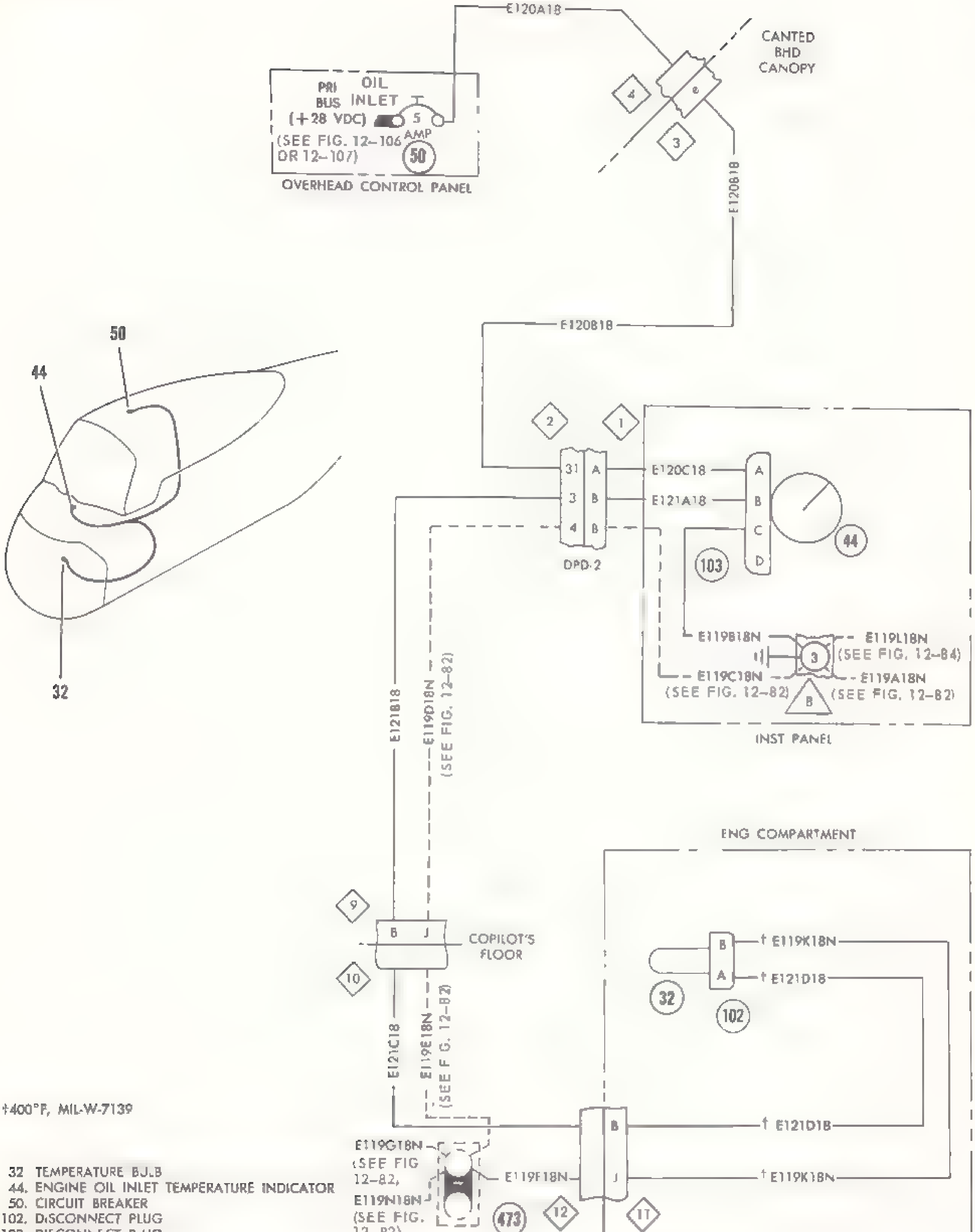


NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

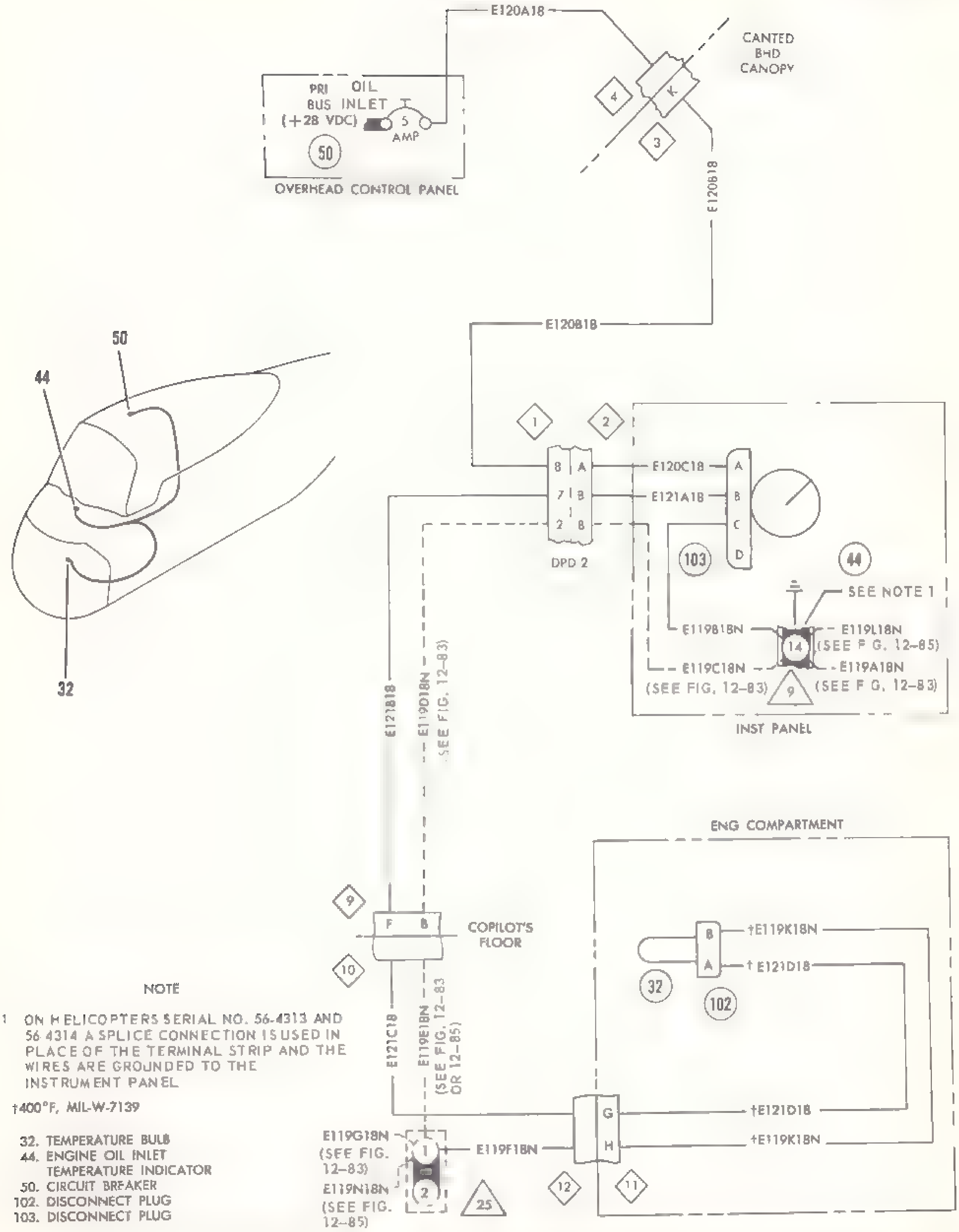
103. DISCONNECT PLUG
164. DISCONNECT PLUG
221. FUSE
243. ENGINE OIL PRESSURE INDICATOR
472. TERMINAL BLOCK
478. ENGINE OIL PRESSURE TRANSMITTER

Figure 12–87 Engine oil pressure indicator (model CH 34A serial No. 56 4313 through 57 1741 and model CH-34C)



32. TEMPERATURE BULB
44. ENGINE OIL INLET TEMPERATURE INDICATOR
50. CIRCUIT BREAKER
102. DISCONNECT PLUG
103. DISCONNECT PLUG

Figure 12—88. Engine oil inlet temperature indicator (model CH-34A serial No. to 56-4313)



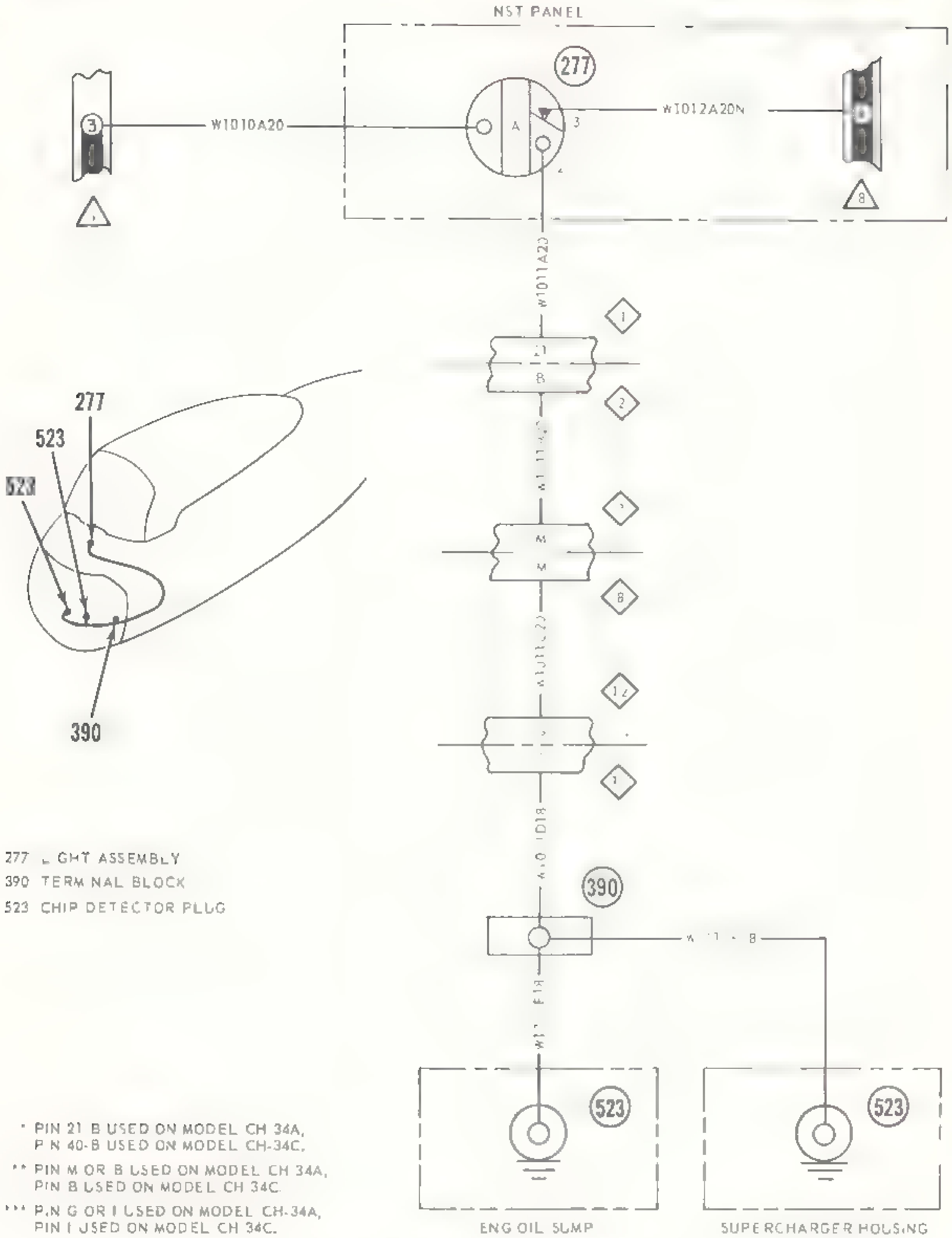
NOTE

1 ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

†400°F, MIL-W-7139

32. TEMPERATURE BULB
44. ENGINE OIL INLET TEMPERATURE INDICATOR
50. CIRCUIT BREAKER
102. DISCONNECT PLUG
103. DISCONNECT PLUG

Figure 12–89. Engine oil inlet temperature indicator (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



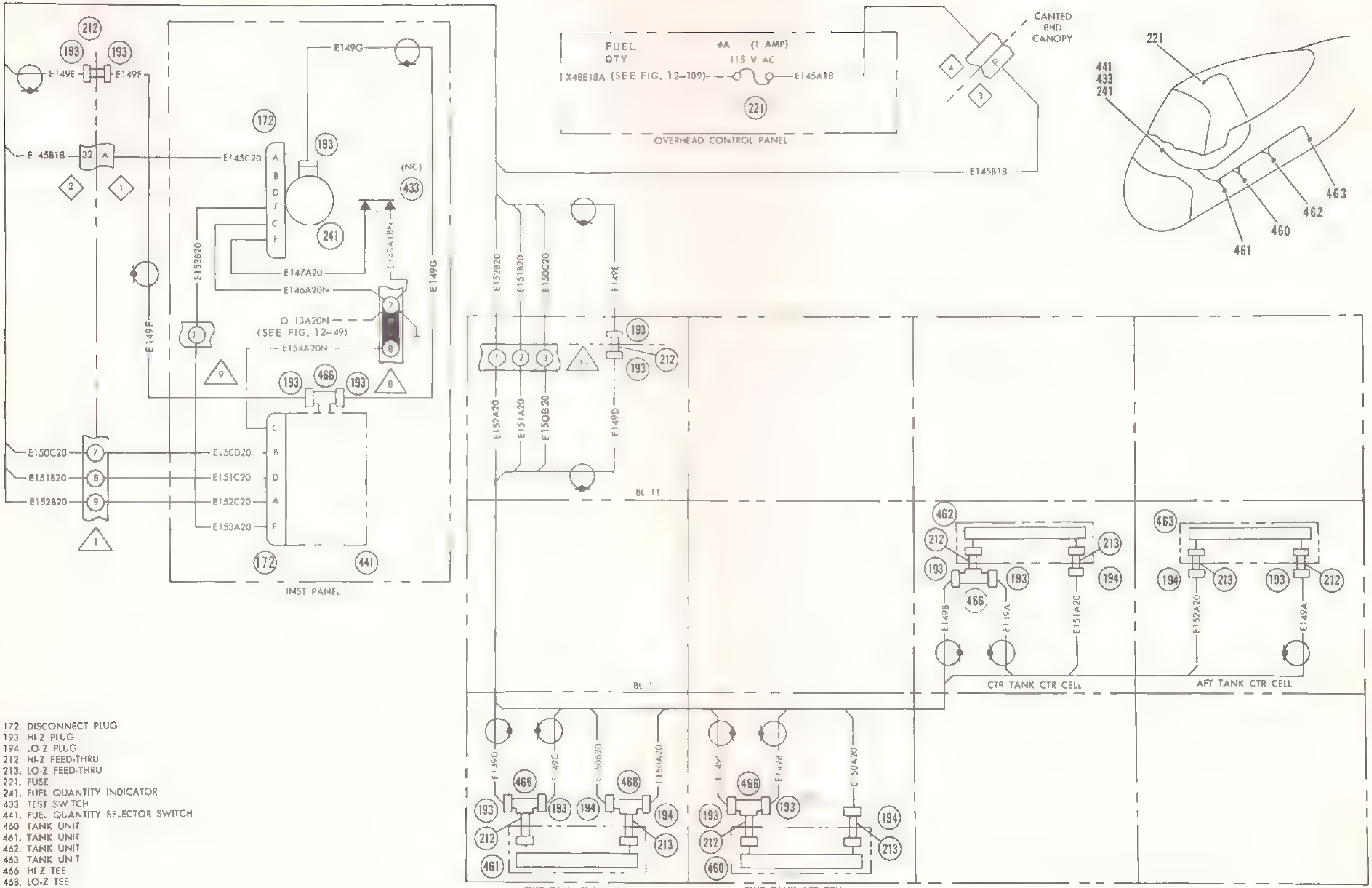
277 LIGHT ASSEMBLY
390 TERMINAL BLOCK
523 CHIP DETECTOR PLUG

* PIN 21 B USED ON MODEL CH 34A,
PIN 40-B USED ON MODEL CH-34C.

** PIN M OR B USED ON MODEL CH 34A,
PIN B USED ON MODEL CH 34C.

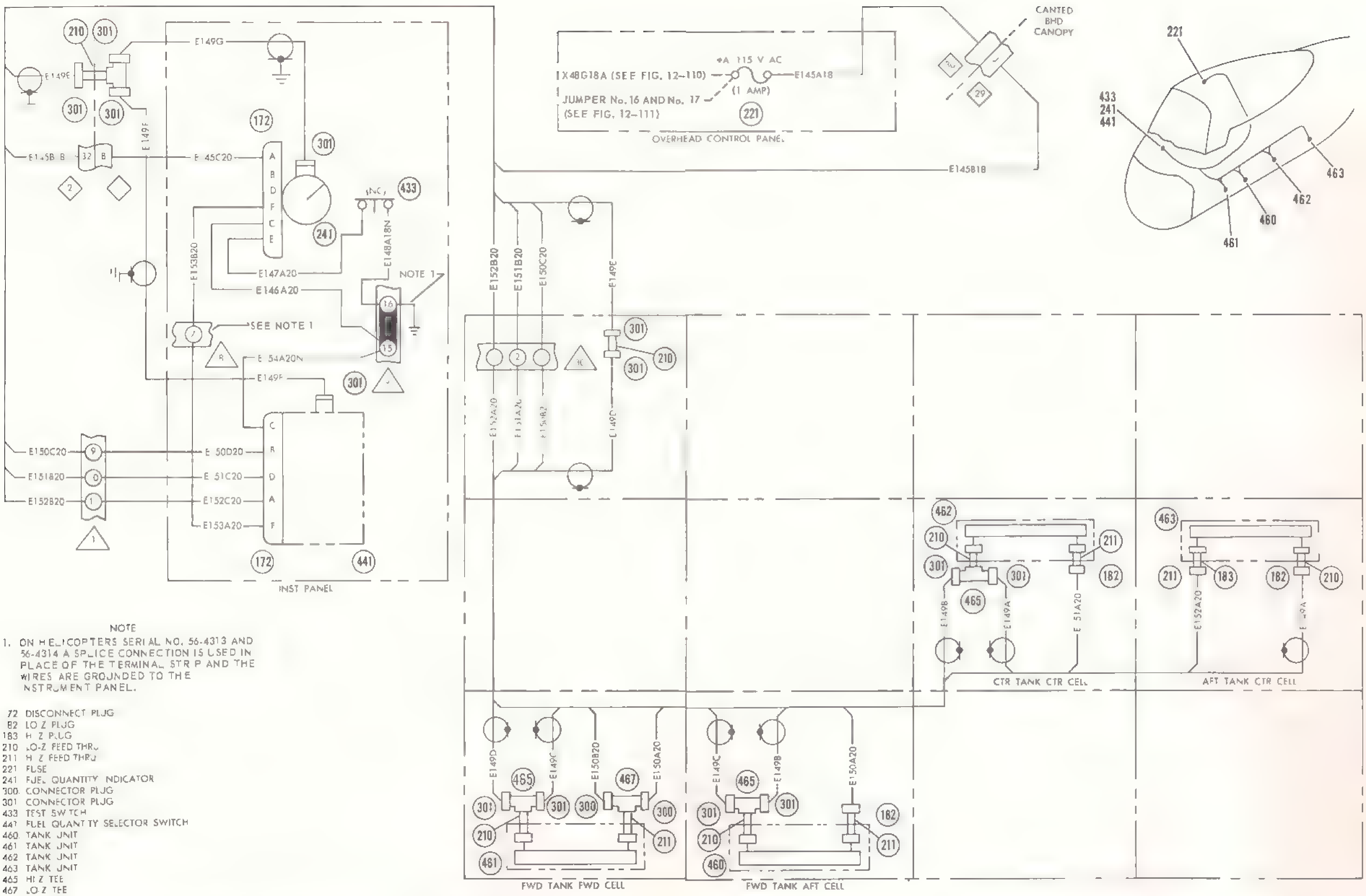
*** PIN G OR I USED ON MODEL CH-34A,
PIN I USED ON MODEL CH 34C.

Figure 12—90. Engine magnetic chip detectors.



172. DISCONNECT PLUG
193. HI-Z PLUG
194. LO-Z PLUG
212. HI-Z FEED-THRU
213. LO-Z FEED-THRU
221. FUSE
241. FUEL QUANTITY INDICATOR
433. TEST SWITCH
441. FUEL QUANTITY SELECTOR SWITCH
460. TANK UNIT
461. TANK UNIT
462. TANK UNIT
463. TANK UNIT
466. HI-Z TEE
468. LO-Z TEE

Figure 12–91. Fuel quantity indicator (model CH-34A serial No. prior to 56-4313)

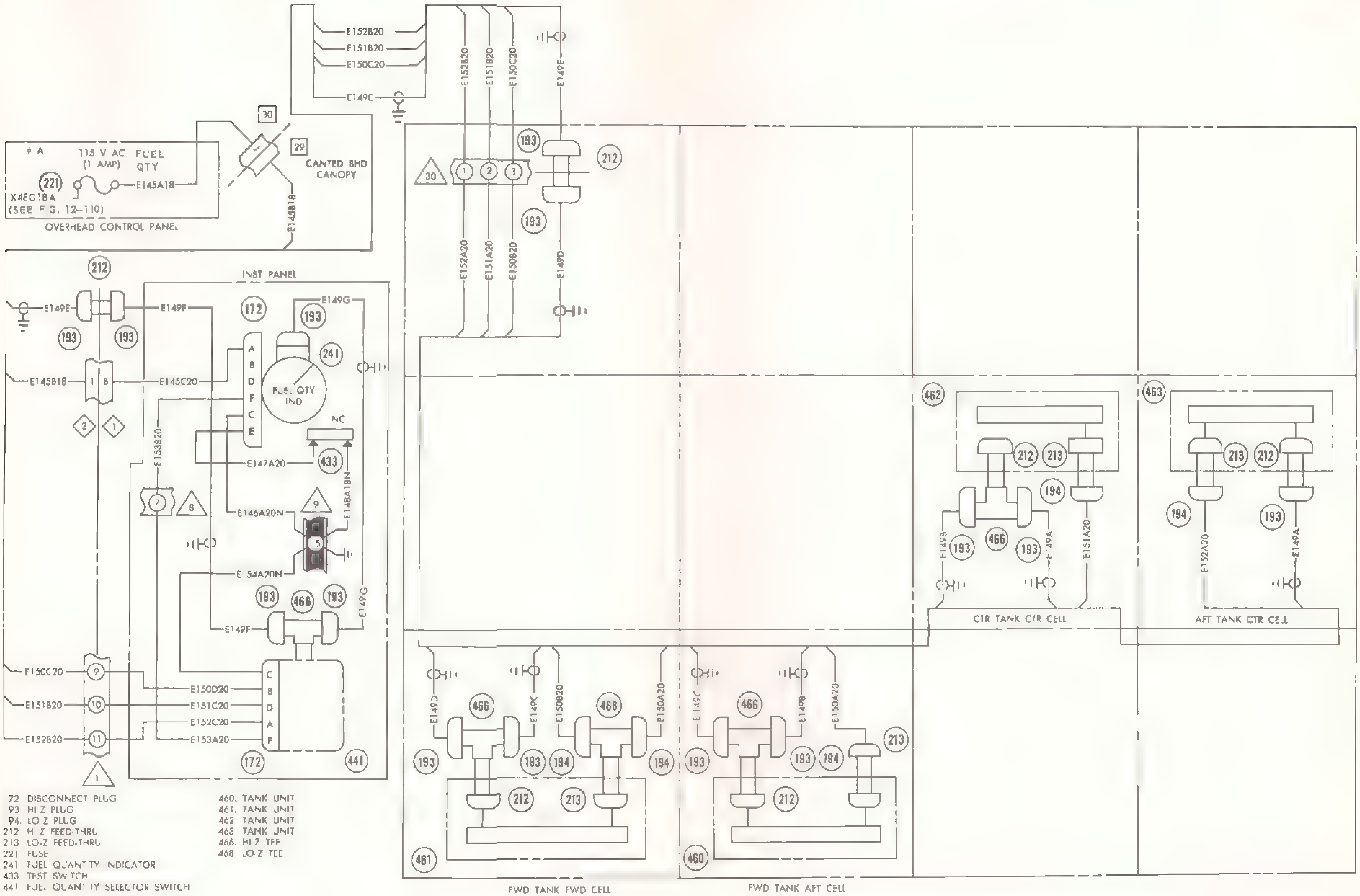


NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

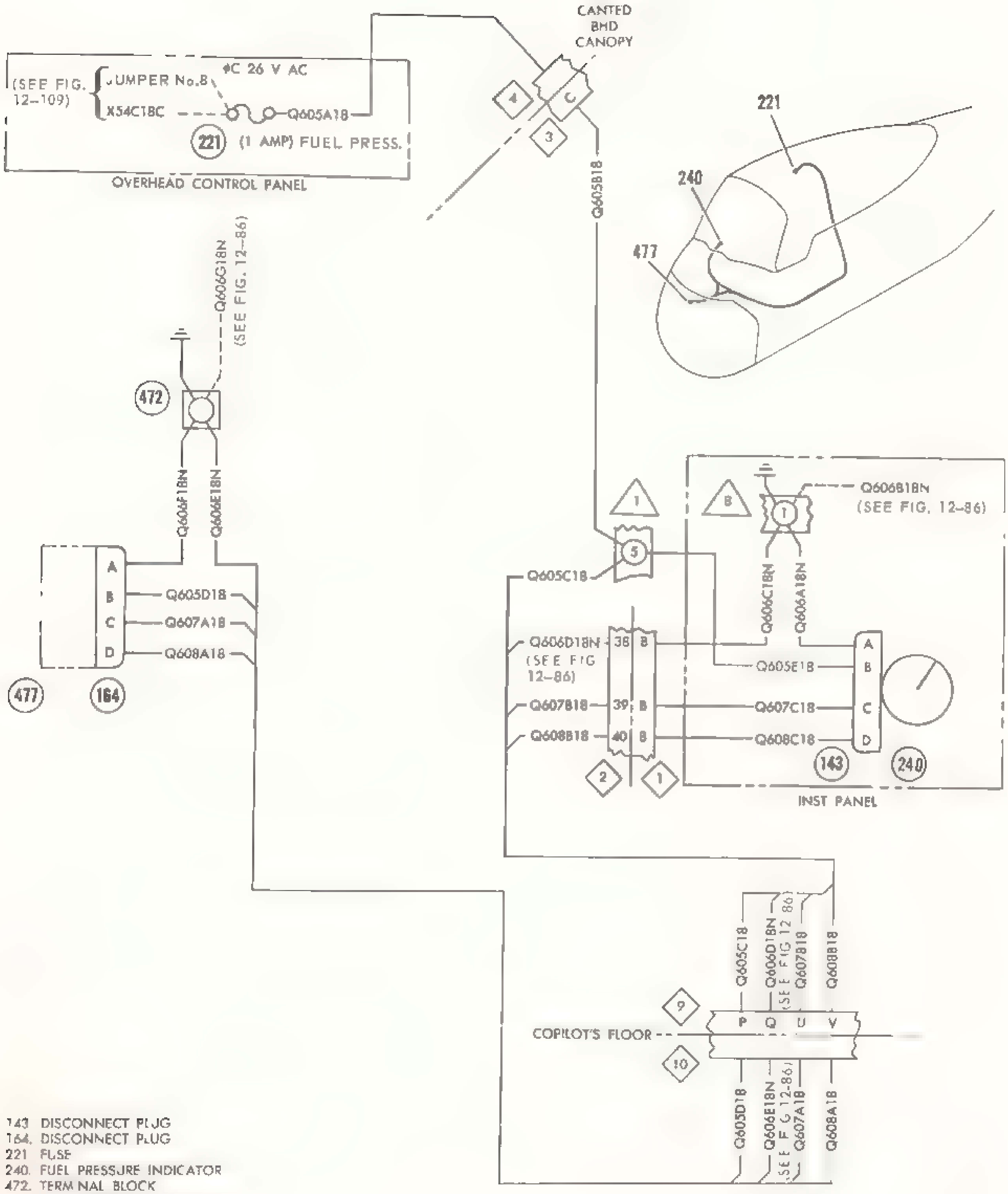
172 DISCONNECT PLUG
182 LO Z PLUG
183 HI Z PLUG
210 LO-Z FEED THRU
211 HI Z FEED THRU
221 FUSE
241 FUEL QUANTITY INDICATOR
300 CONNECTOR PLUG
301 CONNECTOR PLUG
433 TEST SWITCH
441 FUEL QUANTITY SELECTOR SWITCH
460 TANK UNIT
461 TANK UNIT
462 TANK UNIT
463 TANK UNIT
465 HI Z TEE
467 LO Z TEE

Figure 12—92. Fuel quantity indicator (model CH-34A serial No. 56-4313 through 57-1741 and model CH 34C serial No. 57-1742 and subsequent)



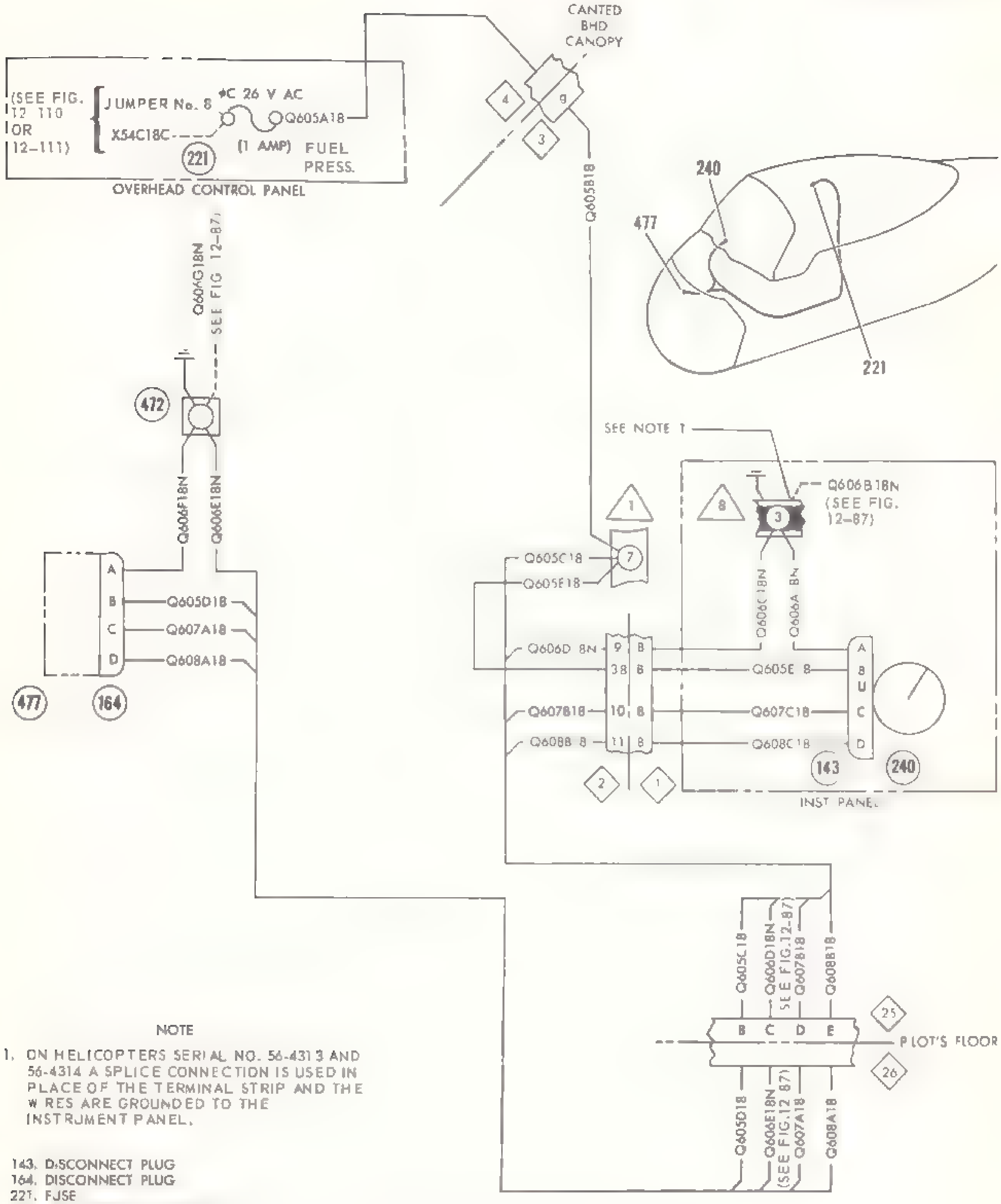
72 DISCONNECT PLUG
93 HI Z PLUG
94 LO Z PLUG
212 HI Z FEED-THRU
213 LO-Z FEED-THRU
221 FUSE
241 FUEL QUANTITY INDICATOR
433 TEST SWITCH
441 FUEL QUANTITY SELECTOR SWITCH
460. TANK UNIT
461. TANK UNIT
462 TANK UNIT
463 TANK UNIT
466. HI Z TEE
468 LO Z TEE

Figure 12–93. Fuel quantity indicator (model CH 34C serial No. prior to 57-1742)



143. DISCONNECT PLUG
164. DISCONNECT PLUG
221. FUSE
240. FUEL PRESSURE INDICATOR
472. TERMINAL BLOCK
477. FUEL PRESSURE TRANSMITTER

Figure 12–94. Fuel pressure indicator (model CH-34A serial No. prior to 56-4313)

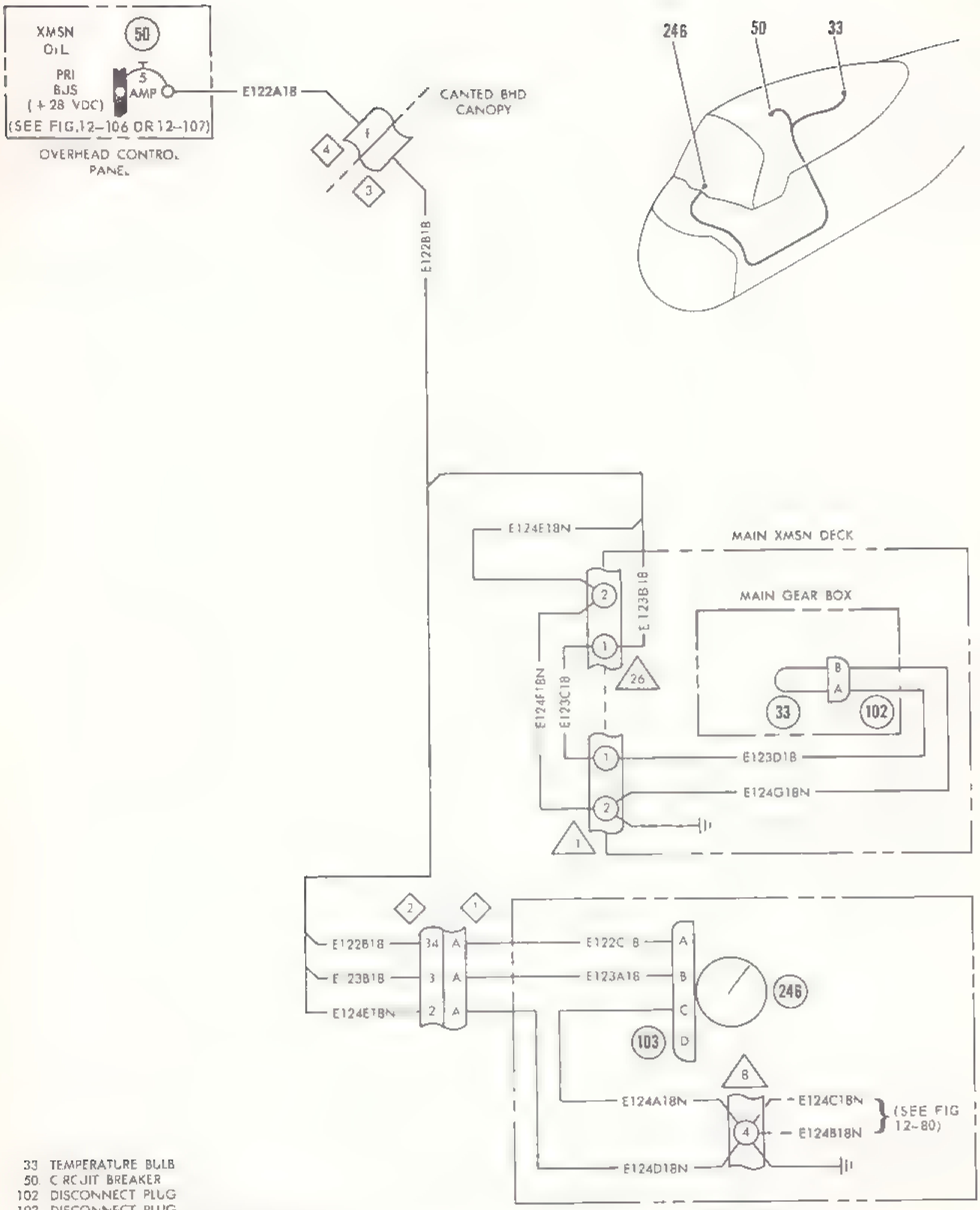


NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

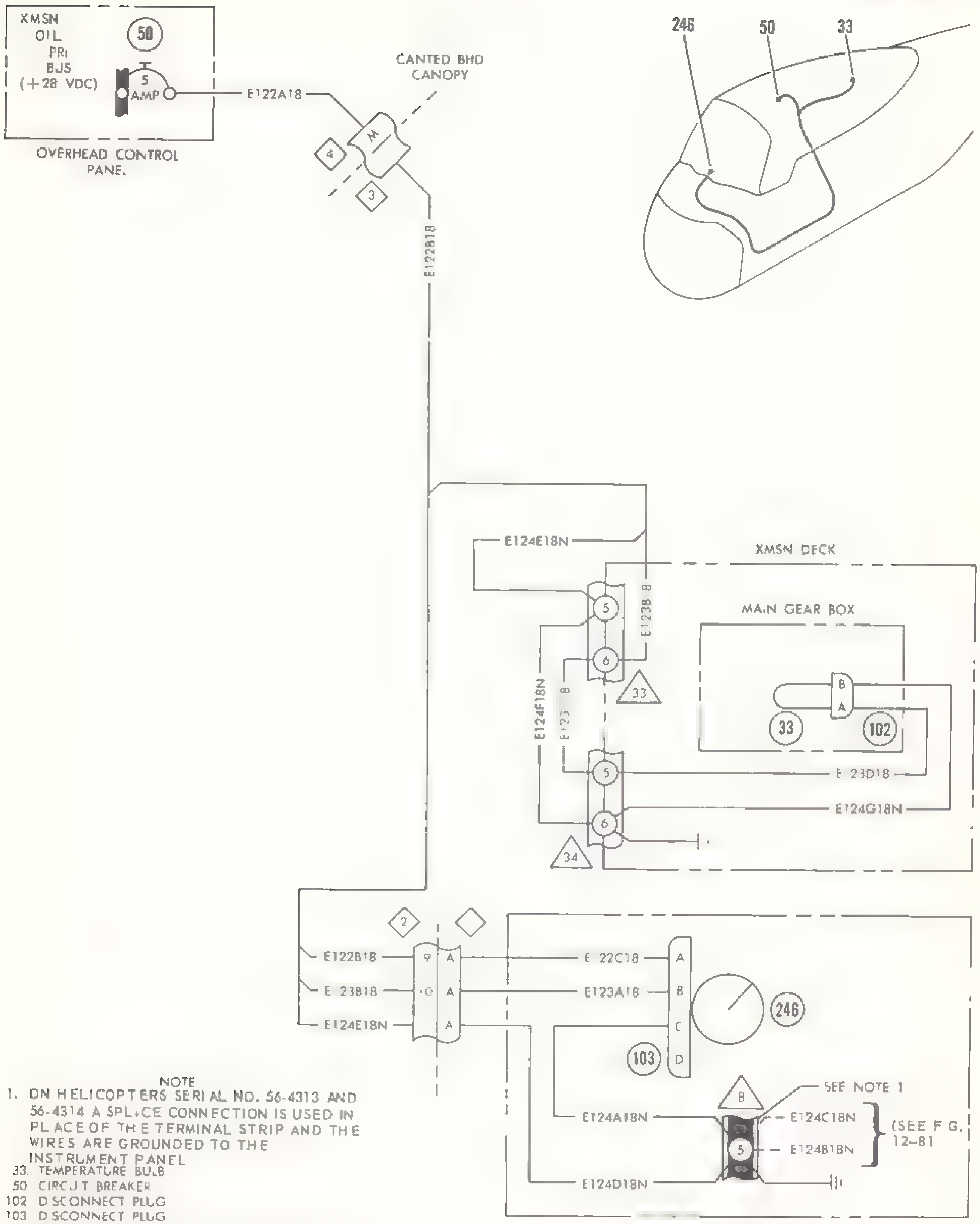
143. DISCONNECT PLUG
164. DISCONNECT PLUG
221. FUSE
240. FUEL PRESSURE INDICATOR
472. TERMINAL BLOCK
477. FUEL PRESSURE TRANSMITTER

Figure 12—95. Fuel pressure indicator (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



33 TEMPERATURE BULB
50 CIRCUIT BREAKER
102 DISCONNECT PLUG
103 DISCONNECT PLUG
246 TRANSMISSION OIL TEMPERATURE INDICATOR

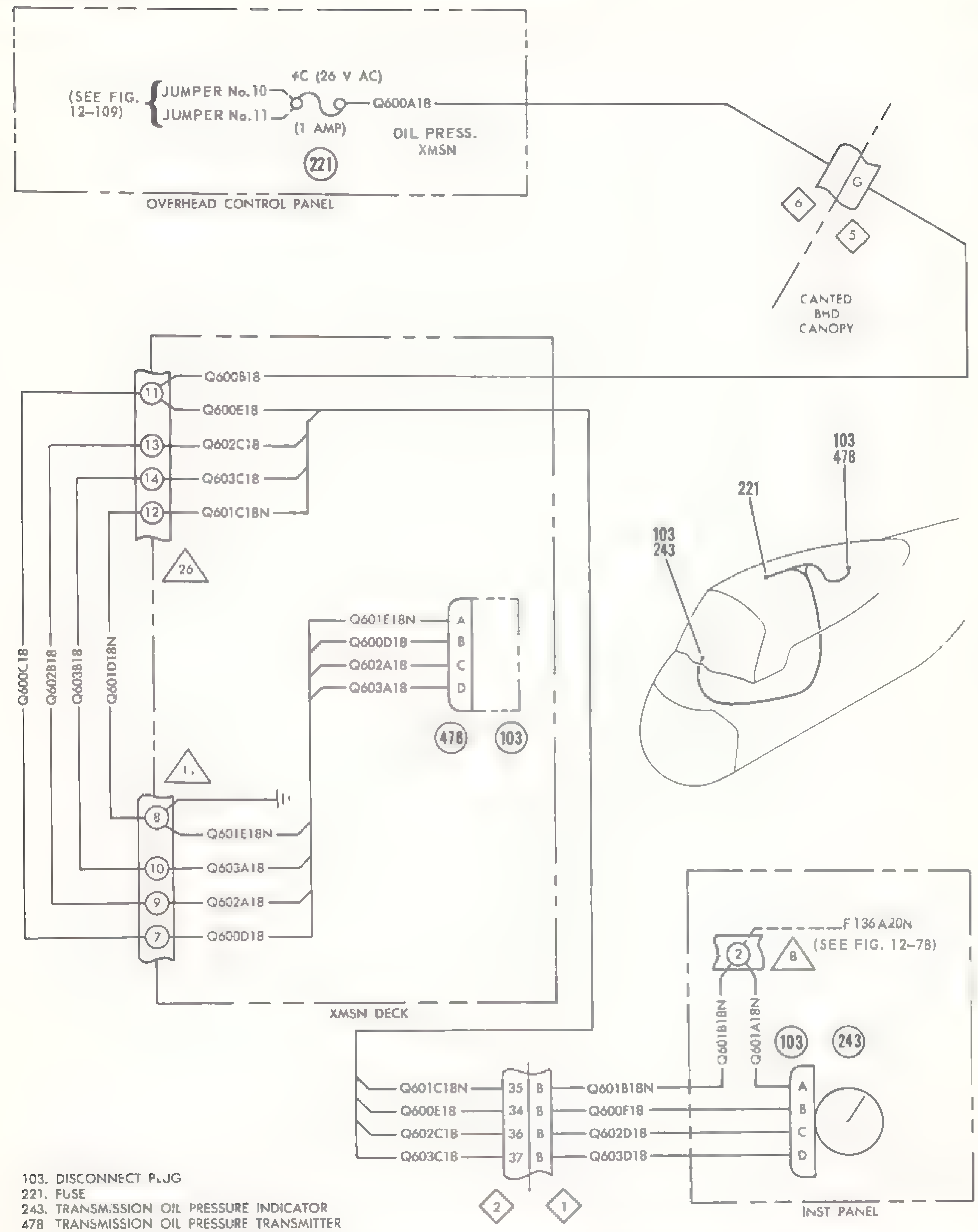
Figure 12—96. Transmission oil temperature indicator (model CH-34A serial No. prior to 56-4313)



NOTE
1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL

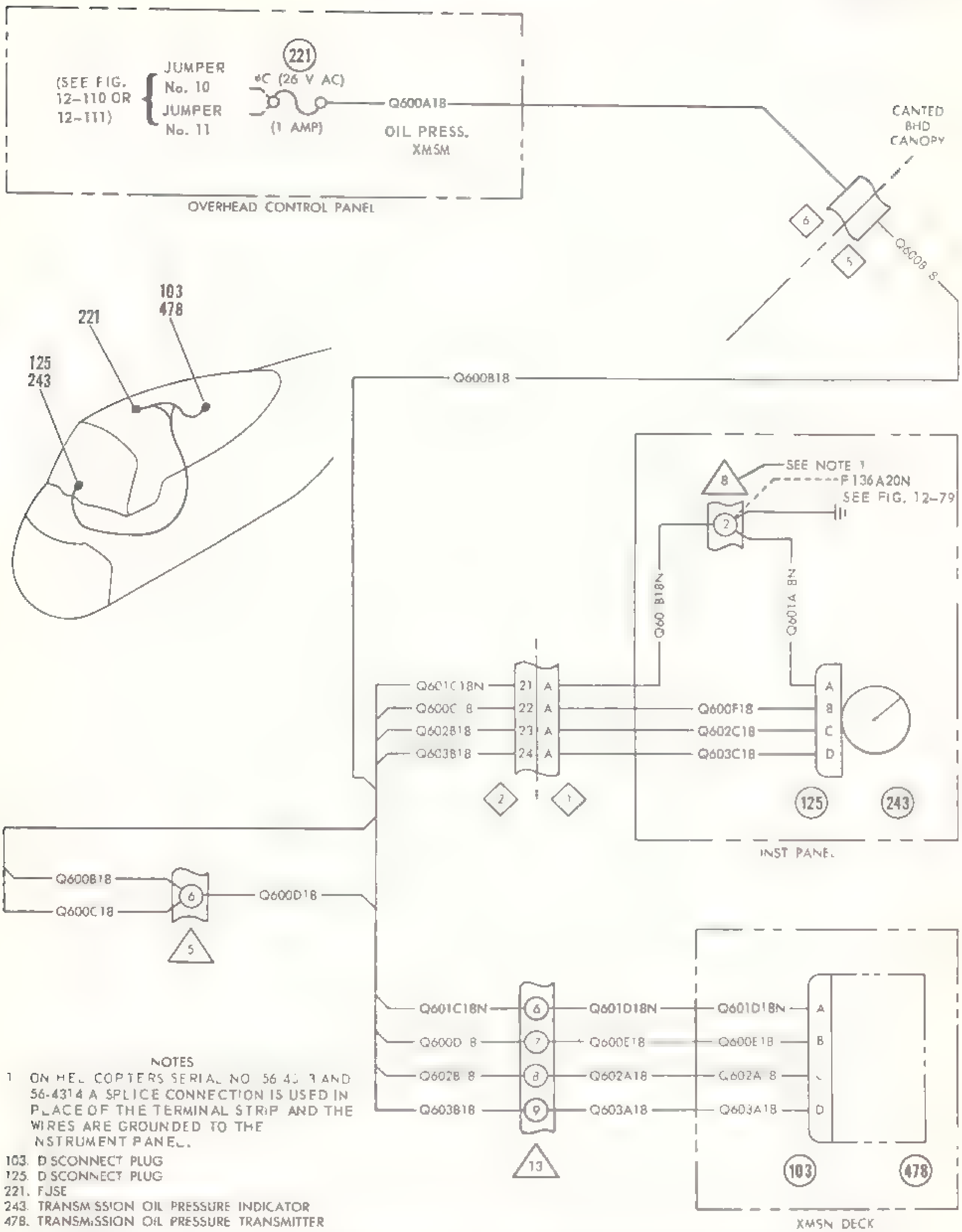
33 TEMPERATURE BULB
50 CIRCUIT BREAKER
102 DISCONNECT PLUG
103 DISCONNECT PLUG
246 TRANSMISSION OIL TEMPERATURE INDICATOR

Figure 12–97. Transmission oil temperature indicator (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



103. DISCONNECT PLUG
221. FUSE
243. TRANSMISSION OIL PRESSURE INDICATOR
478 TRANSMISSION OIL PRESSURE TRANSMITTER

Figure 12–98. Transmission oil pressure indicator (model CH-34A serial No. prior to 56-4313)

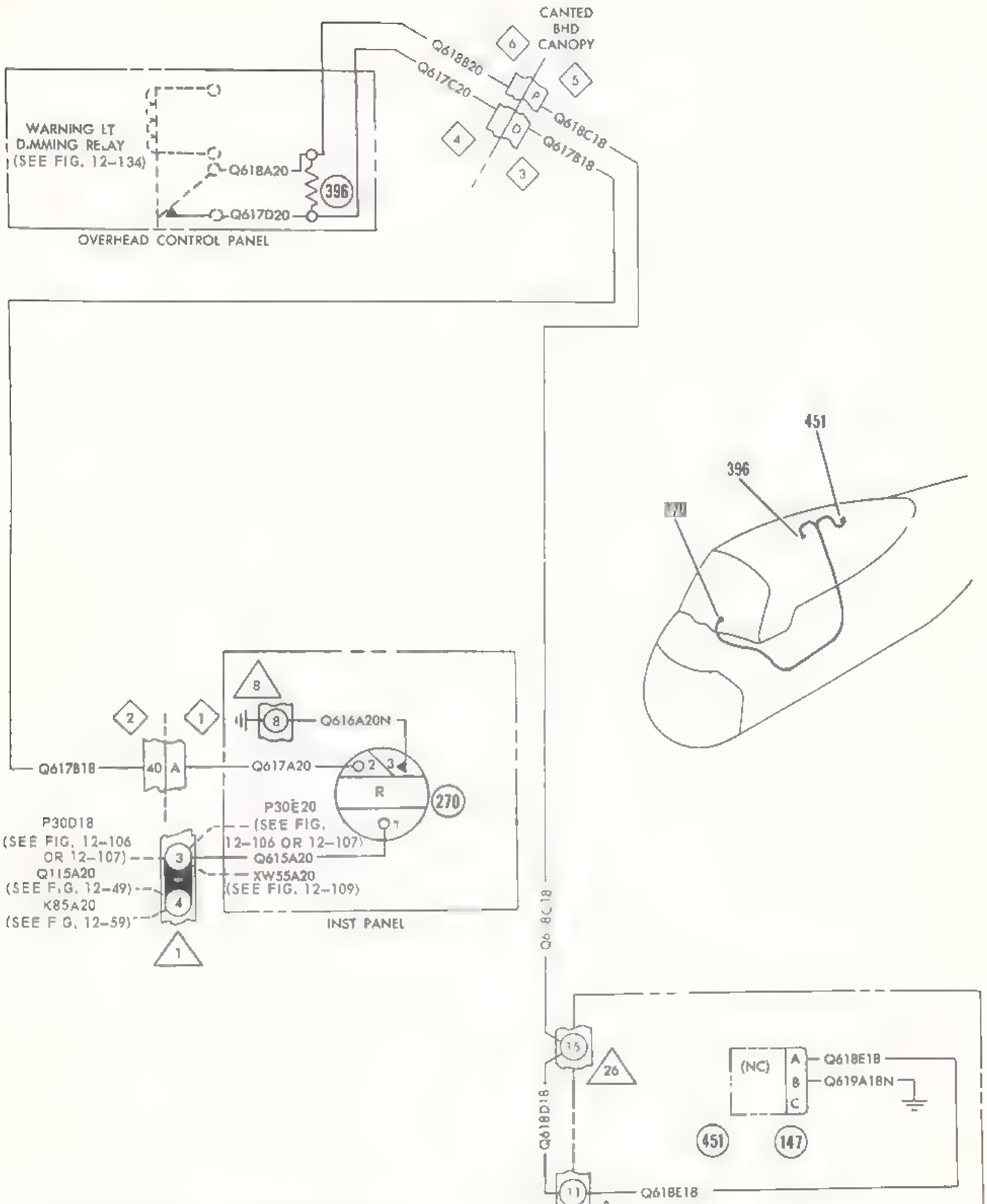


NOTES

1 ON HELICOPTERS SERIAL NO 56-43 3 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

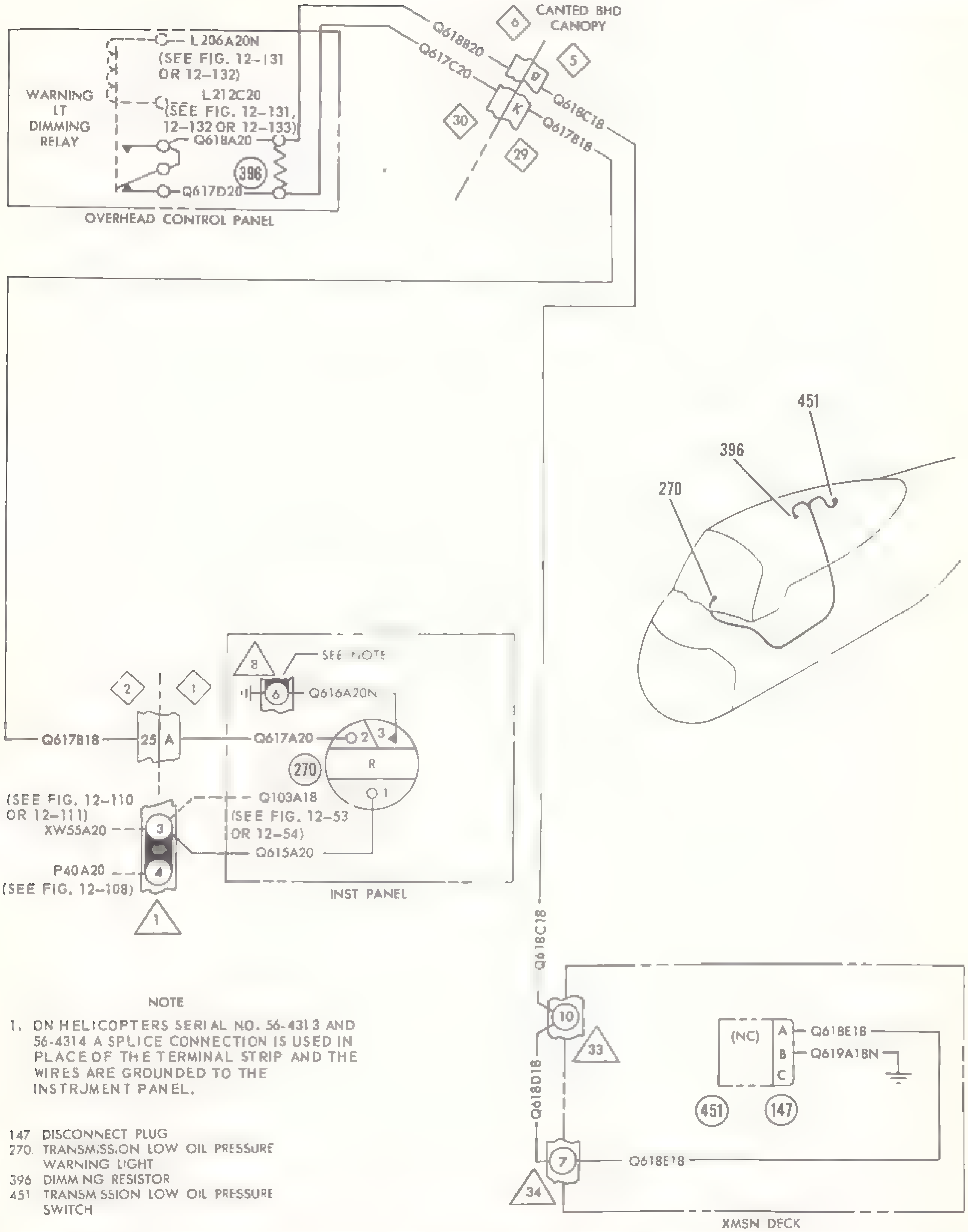
103. DISCONNECT PLUG
125. DISCONNECT PLUG
221. FUSE
243. TRANSMISSION OIL PRESSURE INDICATOR
478. TRANSMISSION OIL PRESSURE TRANSMITTER

Figure 12—99. Transmission oil pressure indicator (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



147. DISCONNECT PLUG
270. TRANSMISSION LOW OIL PRESSURE WARNING LIGHT
396. DIMMING RESISTOR
451. TRANSMISSION LOW OIL PRESSURE SWITCH

Figure 12–100. Transmission low oil pressure warning (model CH-34A serial No. prior to 56-4313)

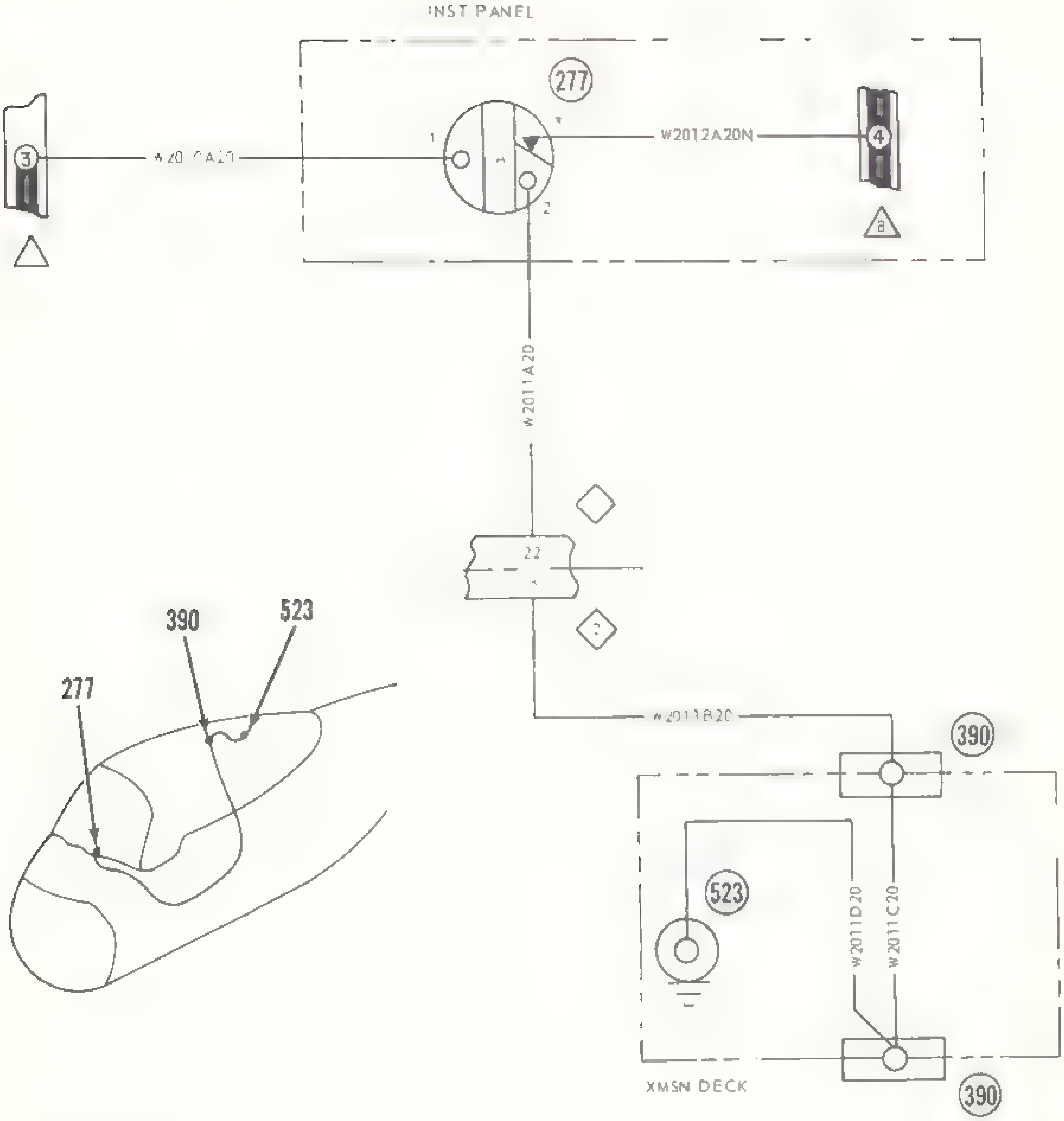


NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

147 DISCONNECT PLUG
270 TRANSMISSION LOW OIL PRESSURE WARNING LIGHT
396 DIMMING RESISTOR
451 TRANSMISSION LOW OIL PRESSURE SWITCH

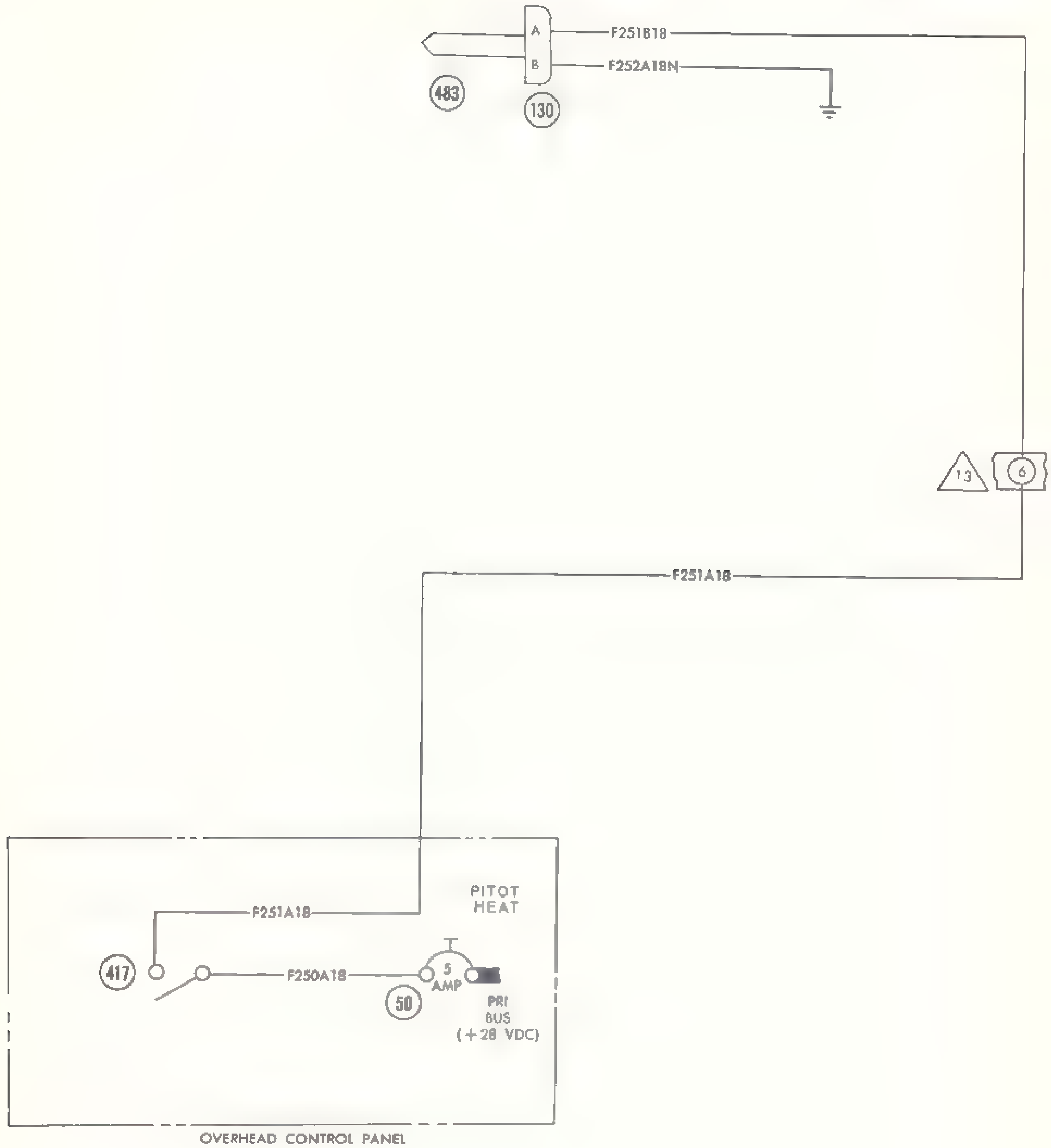
Figure 12–101. Transmission low oil pressure warning (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



277 LIGHT ASSEMBLY
390 TERMINAL BLOCK
523 CHIP DETECTOR PLUG

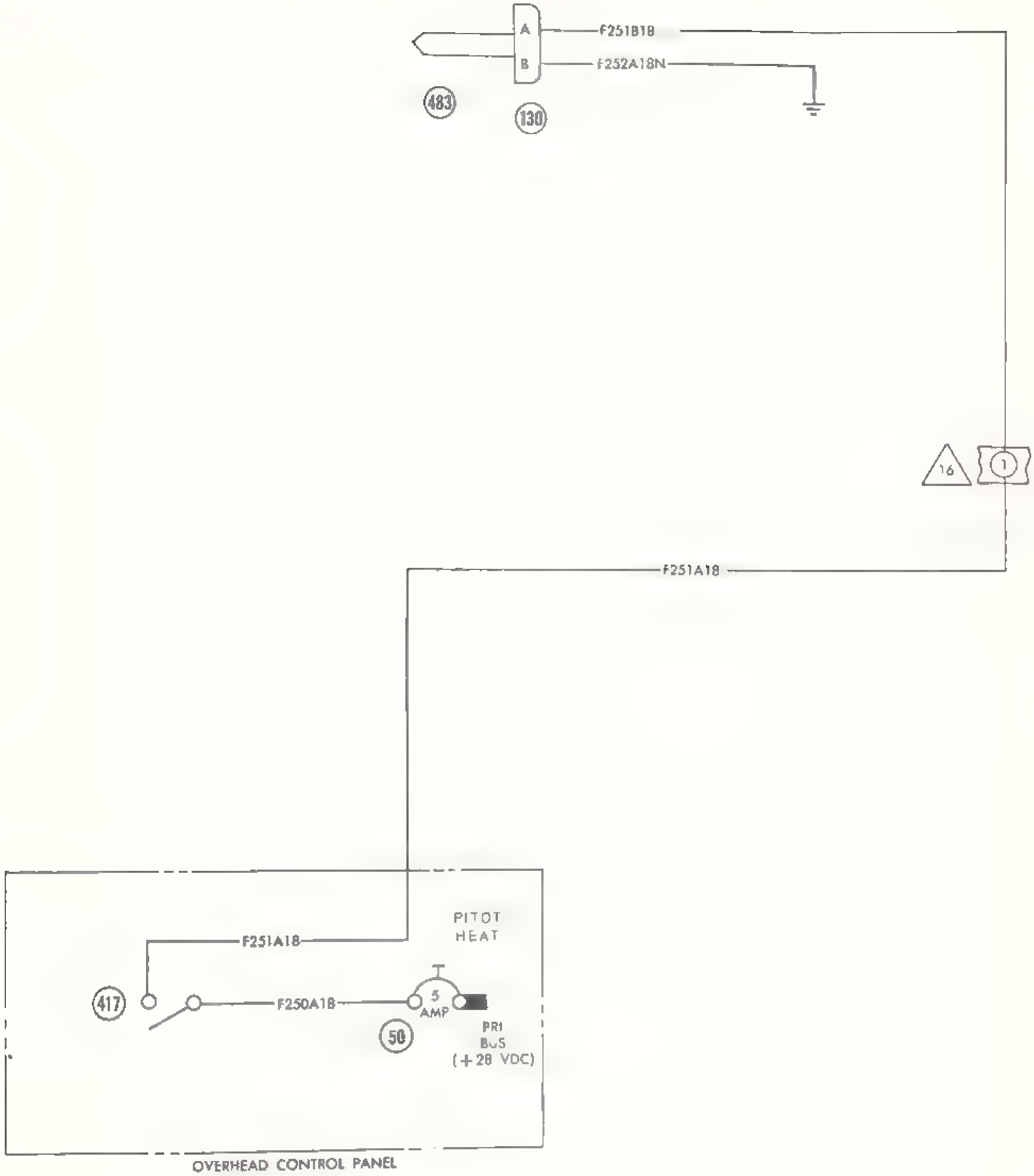
P/N 22-B OR 40-B USED ON MODEL CH-34A. P/N 34-A ON MODEL CH-34C.

Figure 12–102. Transmission magnetic chip detector



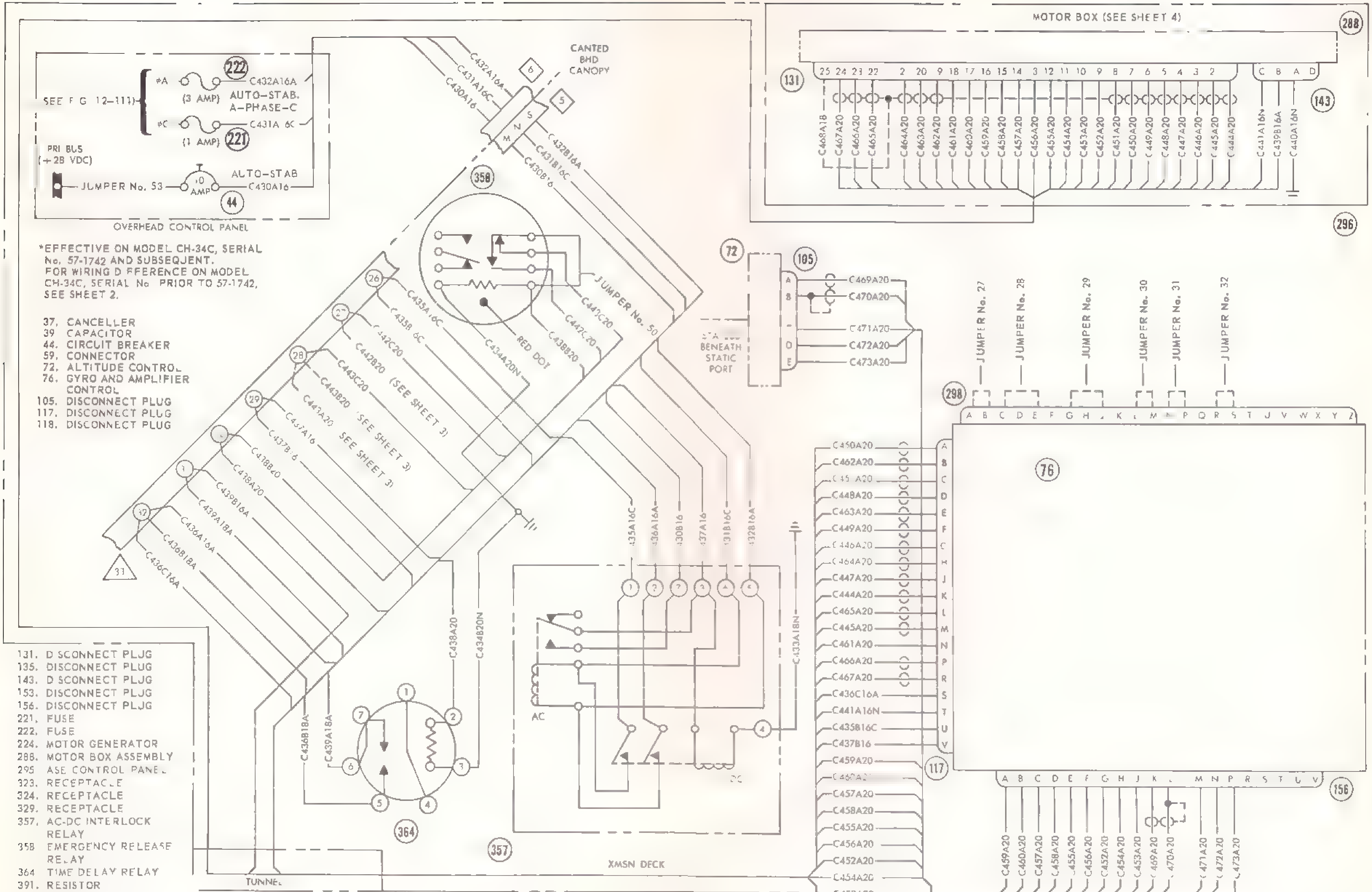
50. CIRCUIT BREAKER
130. DISCONNECT PLUG
417. HEATER SWITCH
483 PITOT HEAT TJBE

Figure 12—103. Pitot tube (model CH-34A serial No. prior to 56-4313)



50. CIRCUIT BREAKER
130. DISCONNECT PLUG
417. HEATER SWITCH
483. PITOT HEAT TUBE

Figure 12—104. Pitot tube (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



37. CANCELLER
39. CAPACITOR
44. CIRCUIT BREAKER
59. CONNECTOR
72. ALTITUDE CONTROL
76. GYRO AND AMPLIFIER CONTROL
105. DISCONNECT PLUG
117. DISCONNECT PLUG
118. DISCONNECT PLUG
131. DISCONNECT PLUG
135. DISCONNECT PLUG
143. DISCONNECT PLUG
153. DISCONNECT PLUG
156. DISCONNECT PLUG
221. FUSE
222. FUSE
224. MOTOR GENERATOR
288. MOTOR BOX ASSEMBLY
295. ASE CONTROL PANEL
323. RECEPTACLE
324. RECEPTACLE
329. RECEPTACLE
357. AC-DC INTERLOCK RELAY
358. EMERGENCY RELEASE RELAY
364. TIME DELAY RELAY
391. RESISTOR
437. SWITCH
443. MICROSWITCH
476. TRANSDUCER
495. RESISTOR

Figure 12–105. Automatic stabilization equipment (model CH-34C) (Sheet 1 of 4)

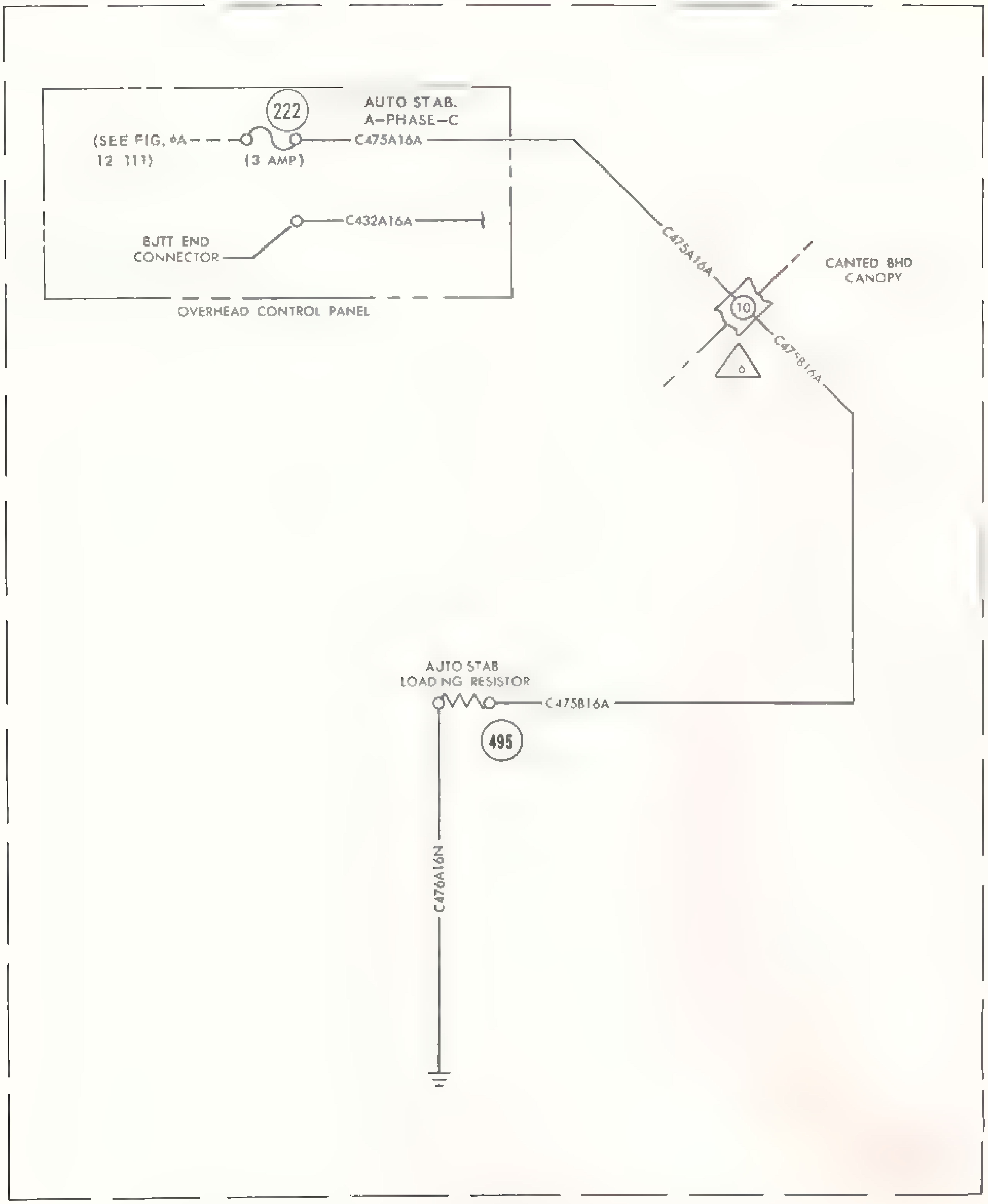


Figure 12—105. Automatic stabilization equipment (model CH-34C) (Sheet 2 of 4)

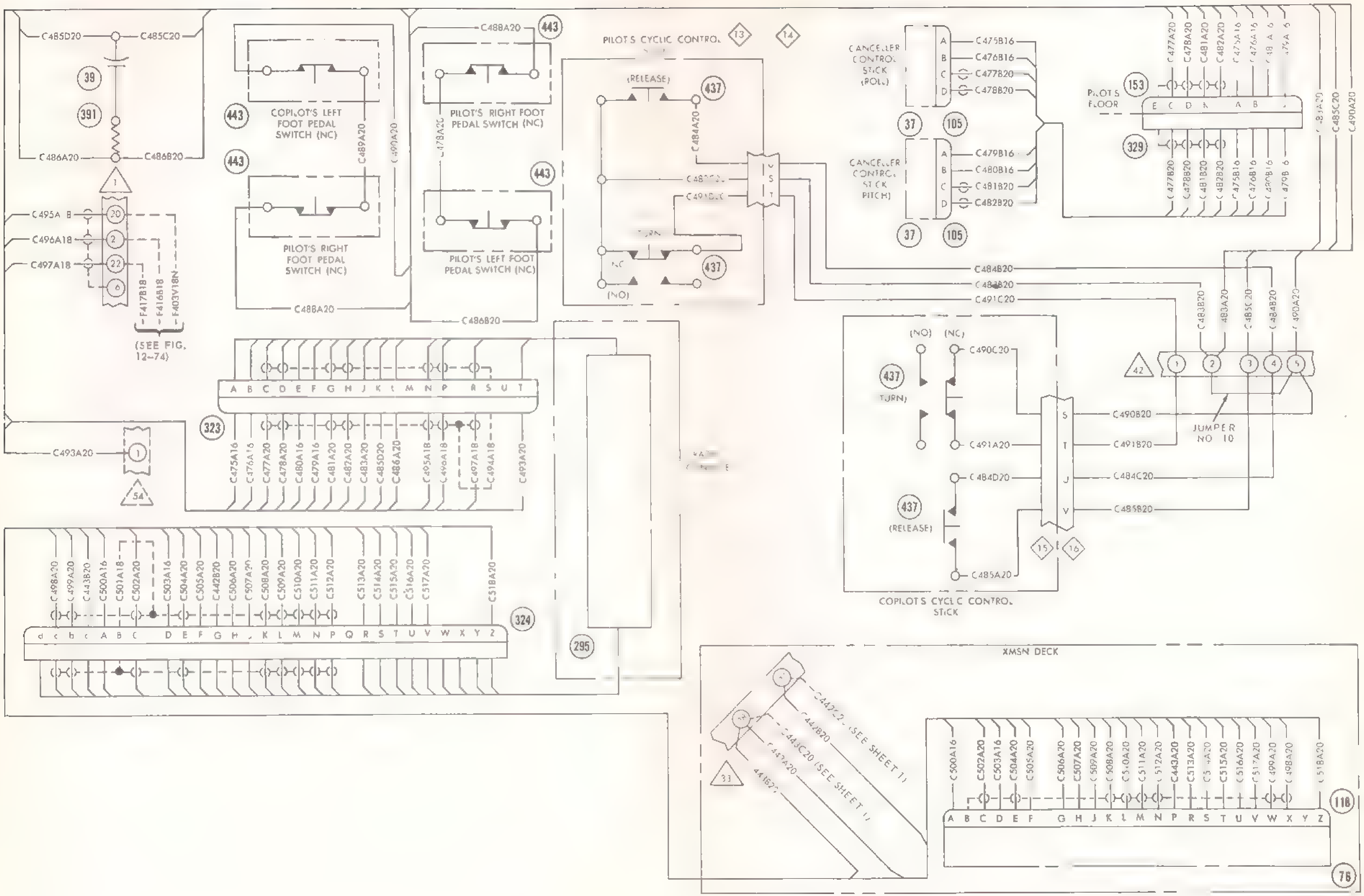


Figure 12—105. Automatic stabilization equipment (model CH 34C) (Sheet 3 of 4)

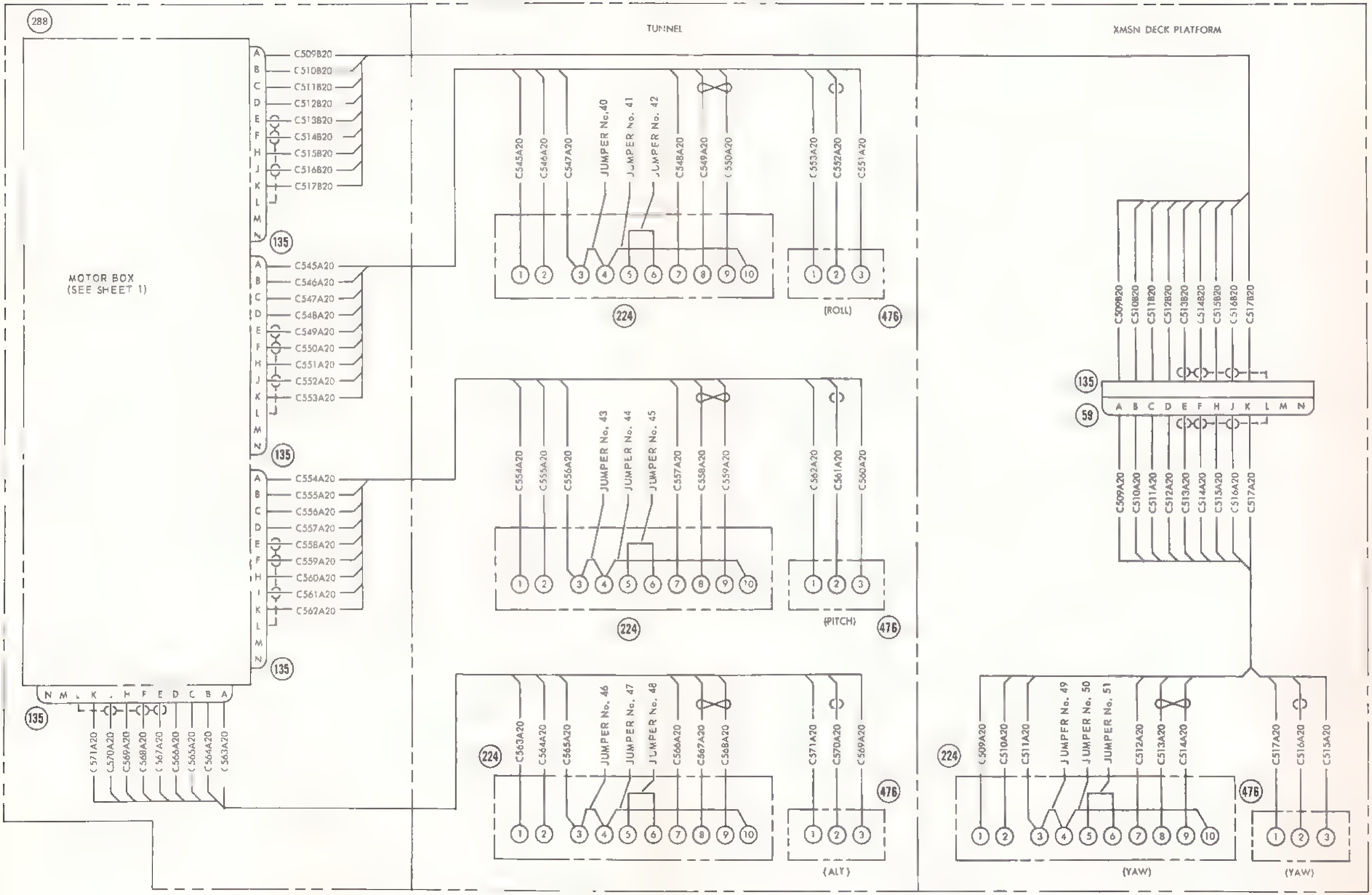
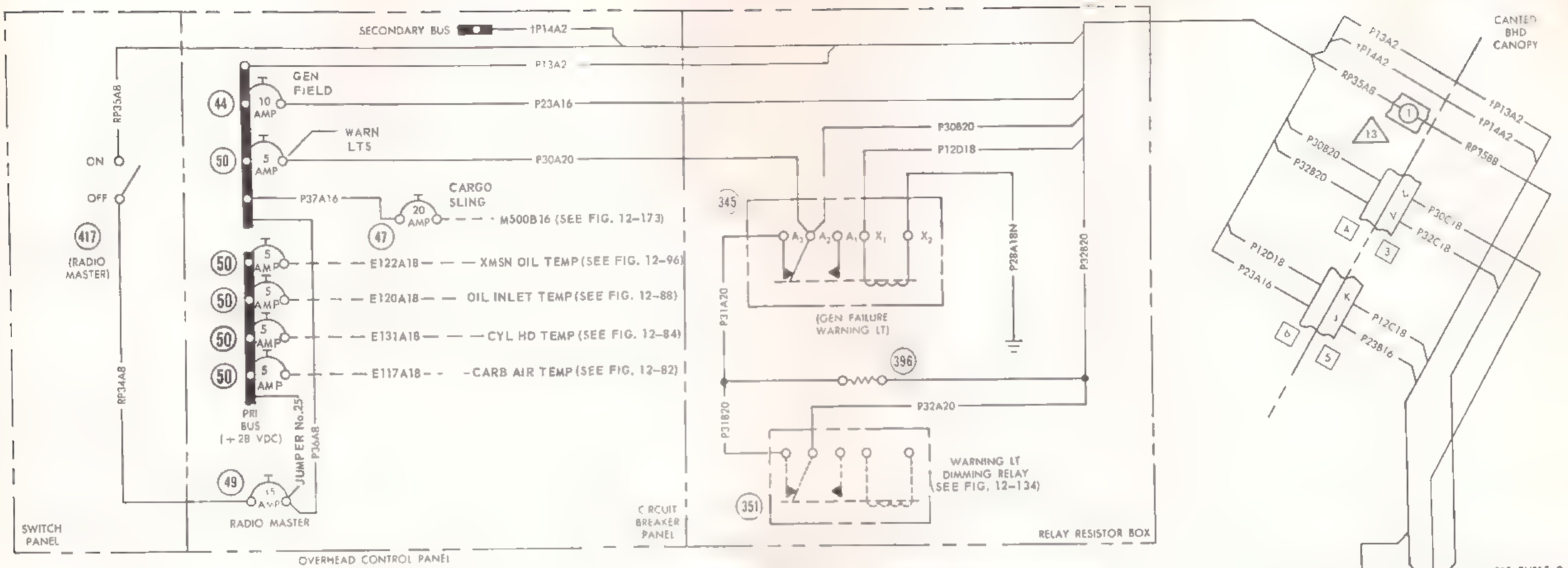
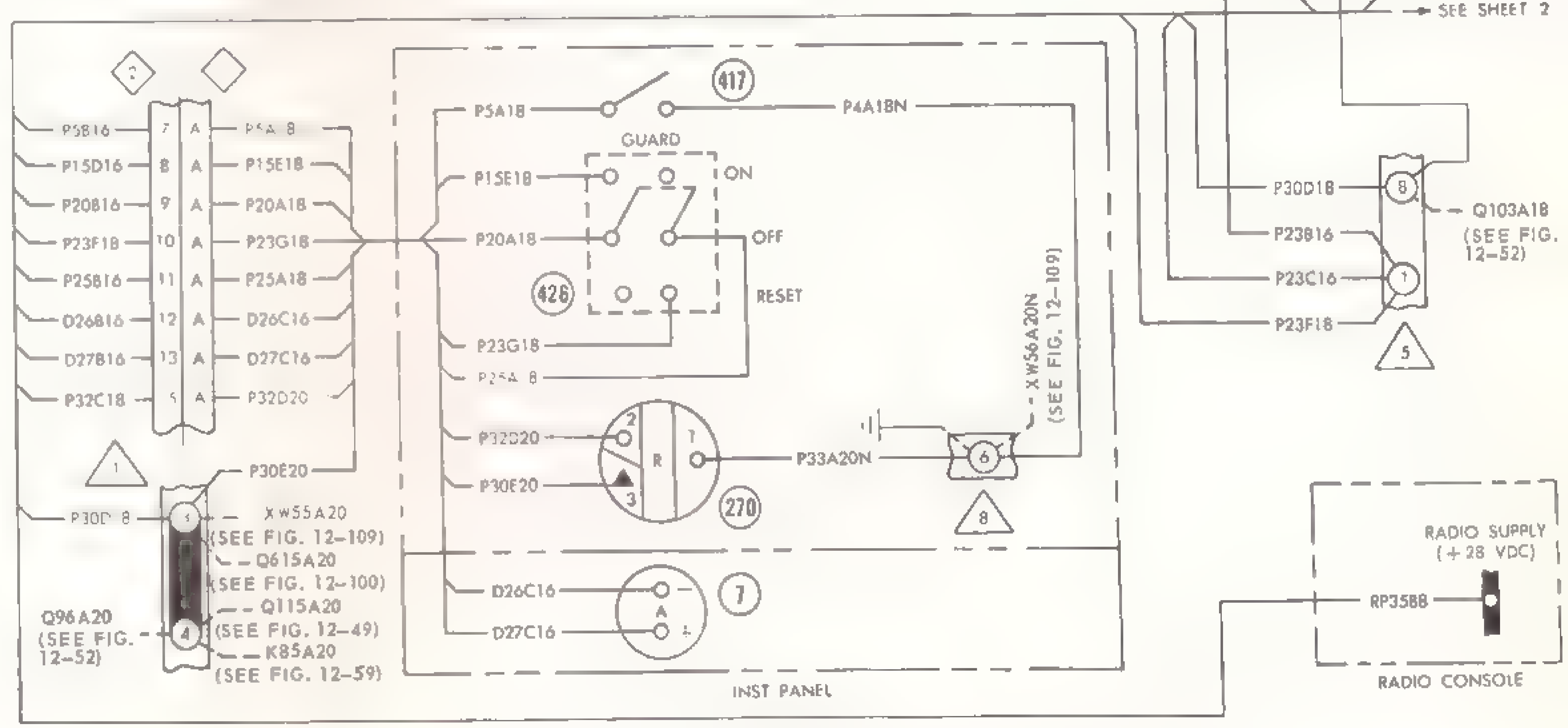
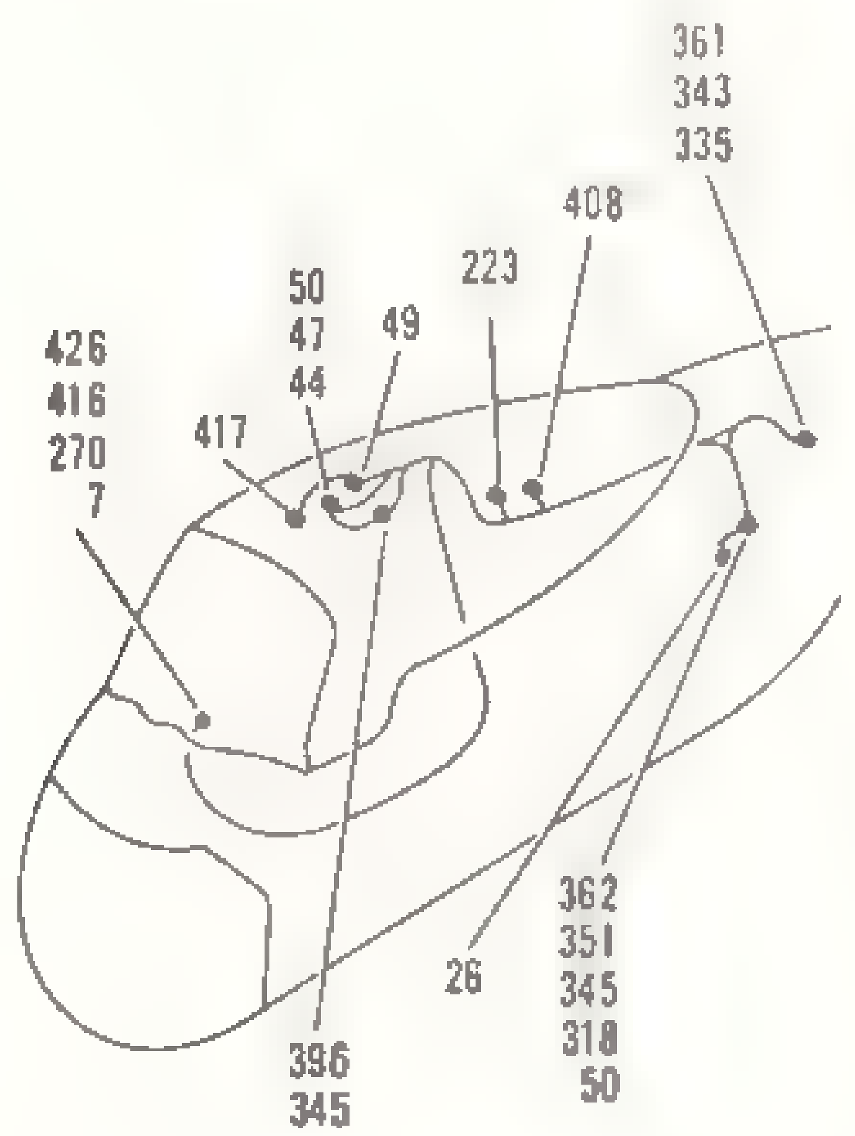


Figure 12—105. Automatic stabilization equipment (model CH-34C) (Sheet 4 of 4)



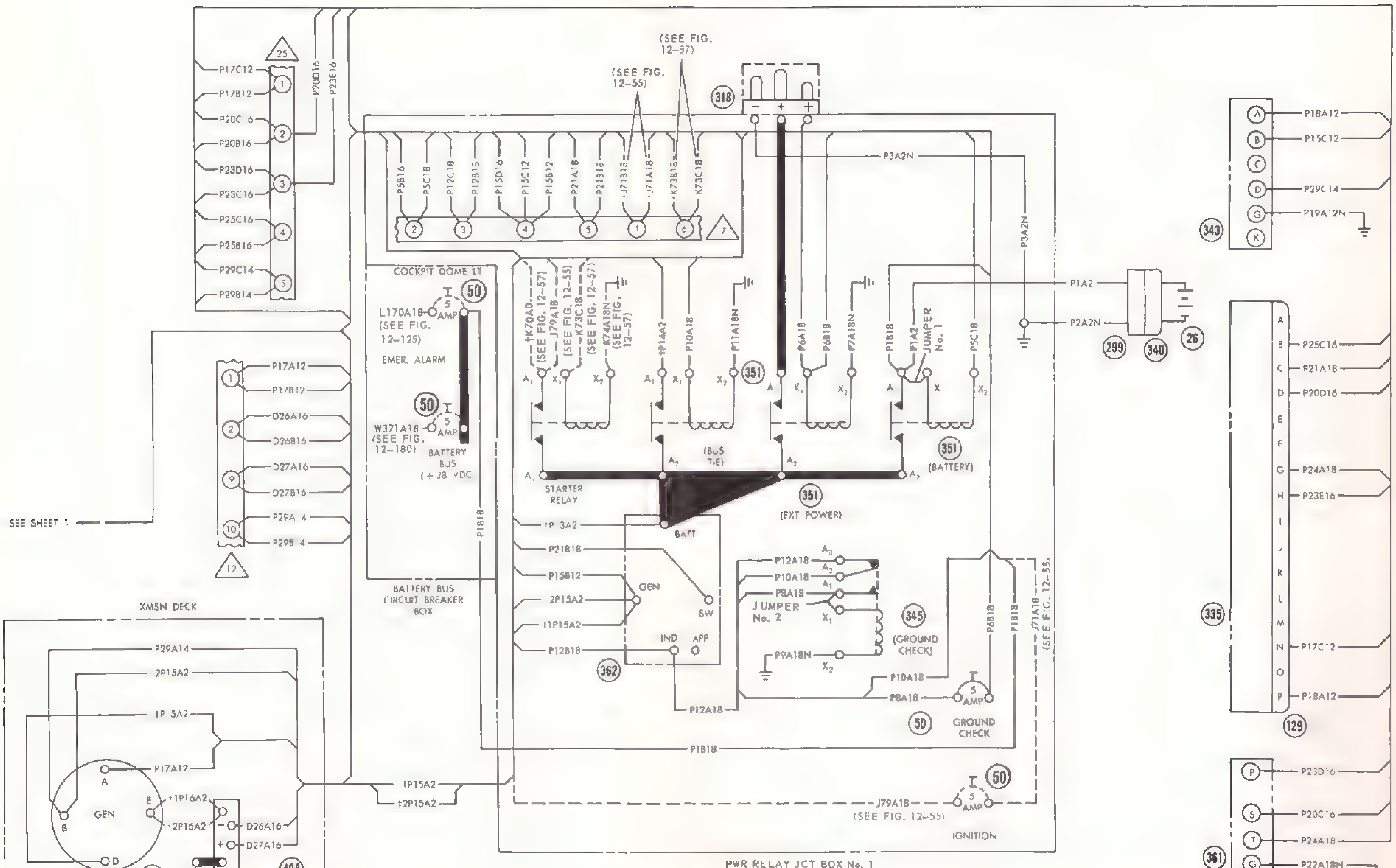




ALUMINUM, MIL-W-7072

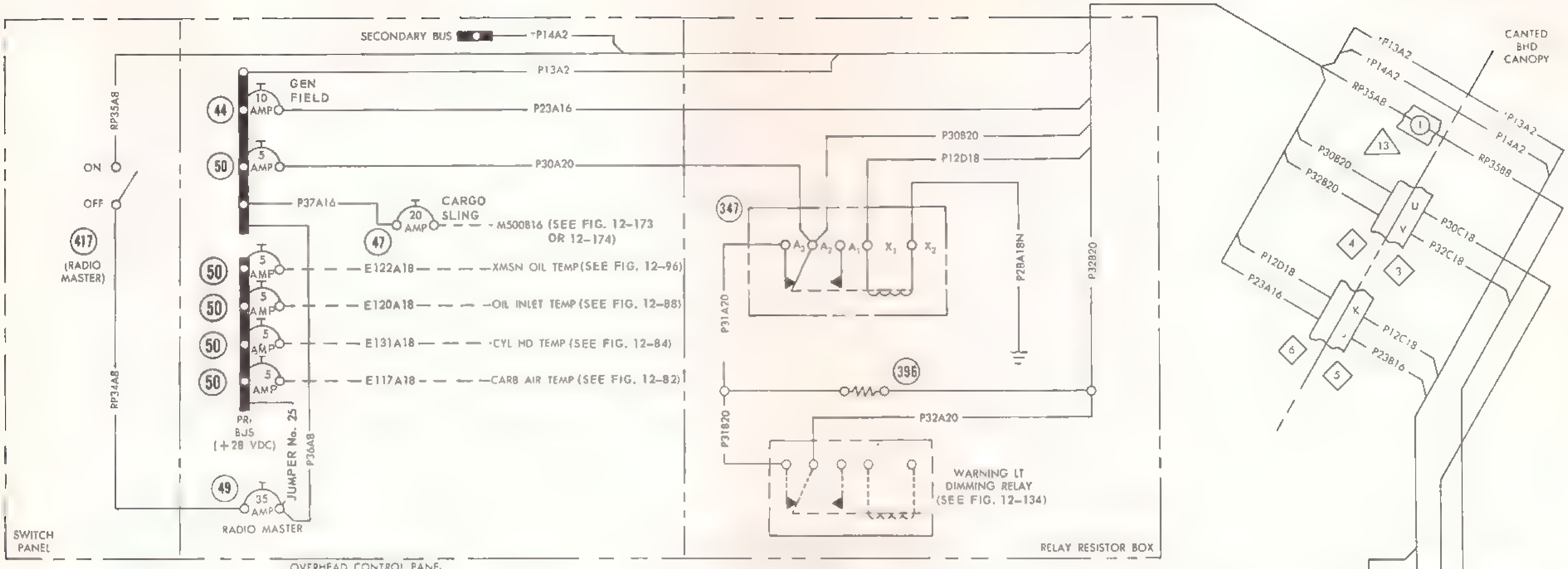
7 AMMETER
26 BATTERY
44. CIRCUIT BREAKER
47. CIRCUIT BREAKER
49. CIRCUIT BREAKER
50. CIRCUIT BREAKER
129 DISCONNECT PLUG
223. GENERATOR
270. GENERATOR FAILURE WARNING LIGHT
299. BATTERY PLUG
318. EXTERNAL POWER RECEPTACLE
335. GENERATOR FIELD CONTROL RELAY
340 RECEPTACLE
343 VOLTAGE REGULATOR
345. RELAY
351. RELAY
361. OVERVOLTAGE RELAY
362 REVERSE CURRENT CUT OUT RELAY
396. WARNING LIGHT DIMMING RESISTOR
408. SHUNT
417. SWITCH
426 GENERATOR SWITCH

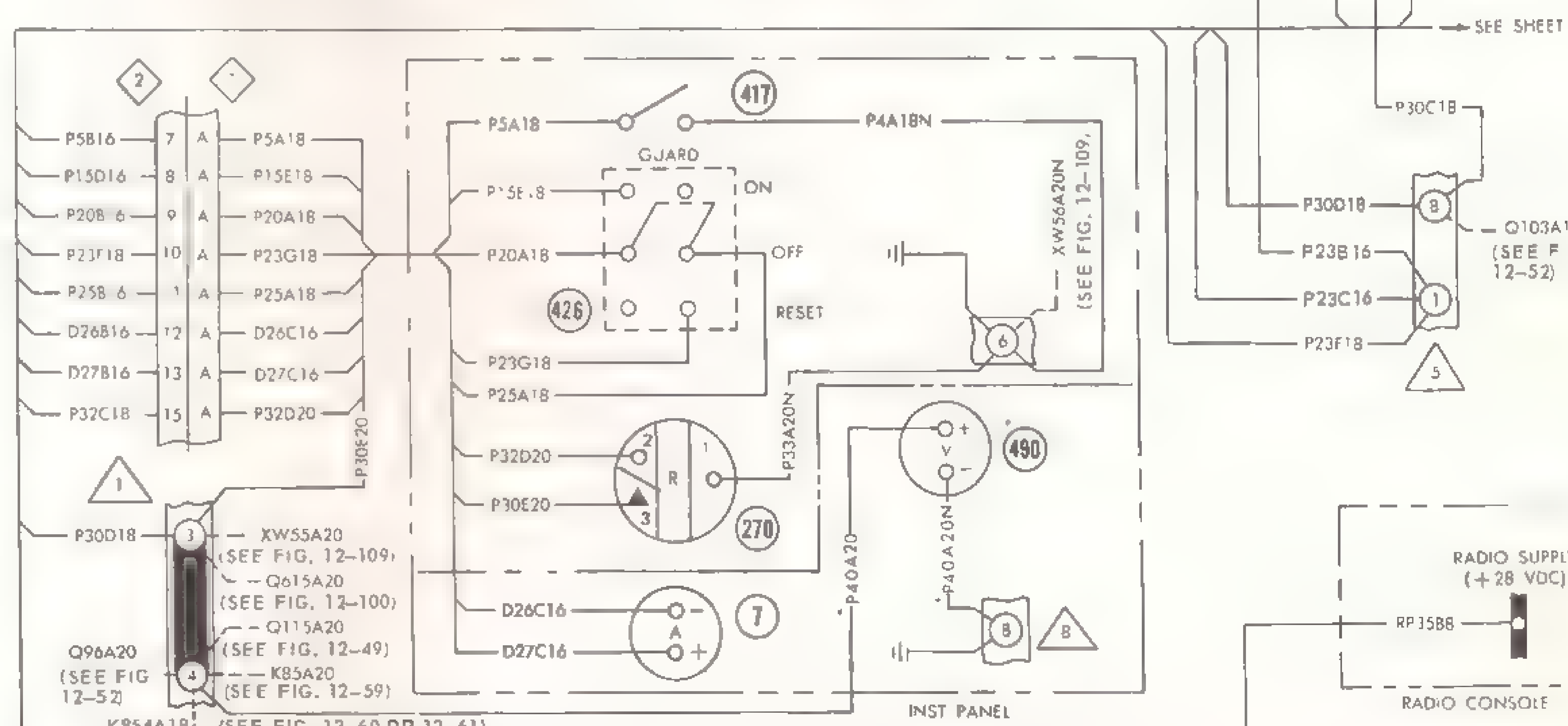
Figure 12–106. DC power (model CH-34A serial No. prior to 54-3040) (Sheet 1 of 2)



†ALUM NUM, MIL W 7072

Figure 12–106. DC power (model CH 34A serial No. prior to 54-3040) (Sheet 2 of 2)





*MODEL CH-34A SERIAL No. 56-4289 AND SUBSEQUENT
†ALUMINUM, MIL-W-7072

7. AMMETER
26. BATTERY
44. CIRCUIT BREAKER
47. CIRCUIT BREAKER
49. CIRCUIT BREAKER
50. CIRCUIT BREAKER
29. DISCONNECT PLUG
223. GENERATOR
270. GENERATOR FAILURE WARNING LIGHT
299. BATTERY PLUG
318. EXTERNAL POWER RECEPTACLE
335. GENERATOR FIELD CONTROL RELAY
340. RECEPTACLE
343. VOLTAGE REGULATOR
347. RELAY
351. RELAY
361. OVERVOLTAGE RELAY
362. REVERSE CURRENT CUT-OUT RELAY
396. WARNING LIGHT DIMMING RESISTOR
408. SHUNT
417. SWITCH
426. GENERATOR SWITCH
490. VOLTMETER

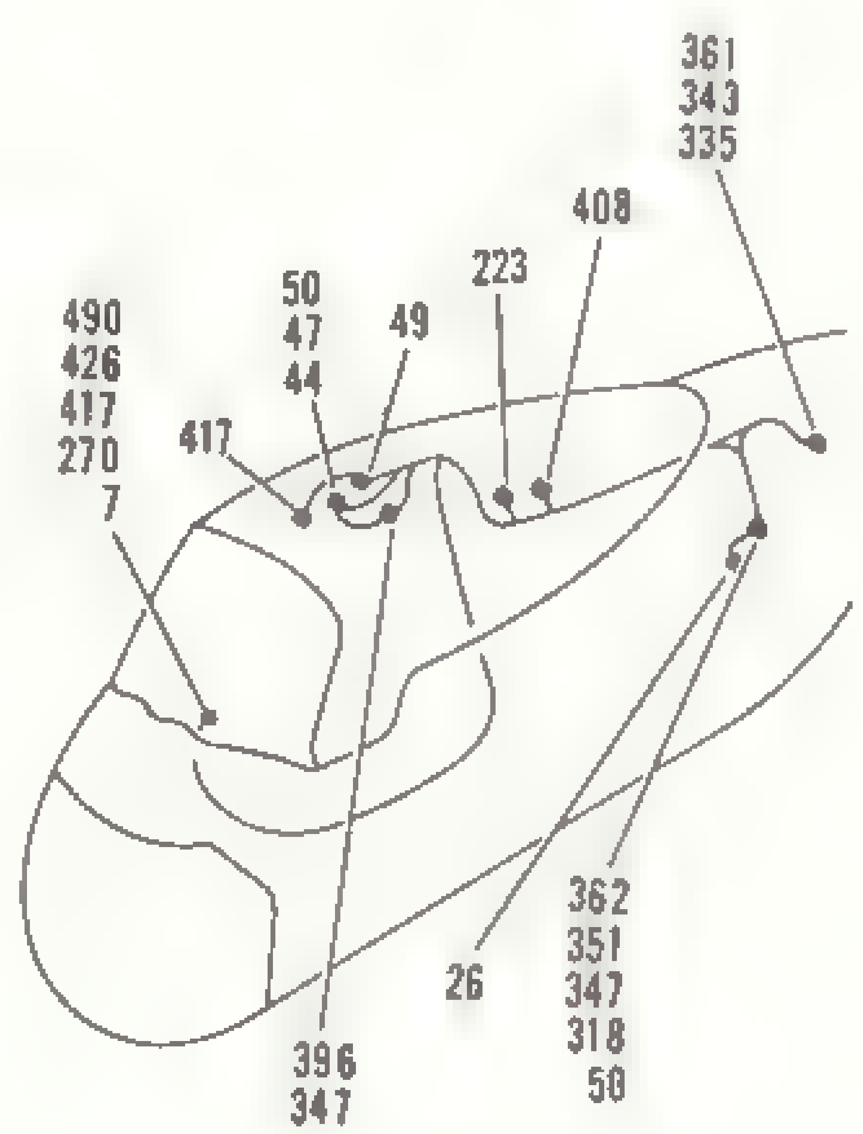
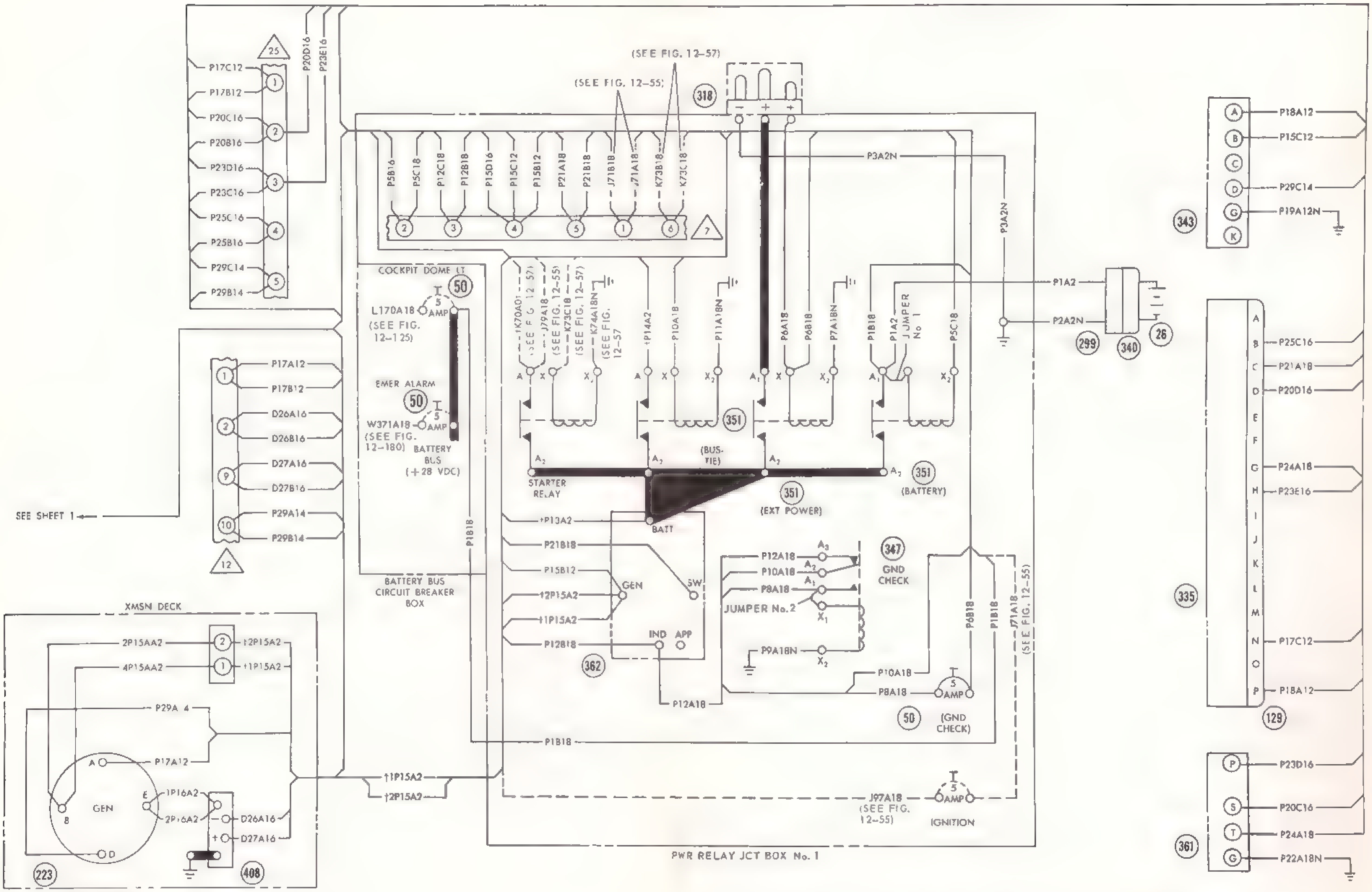
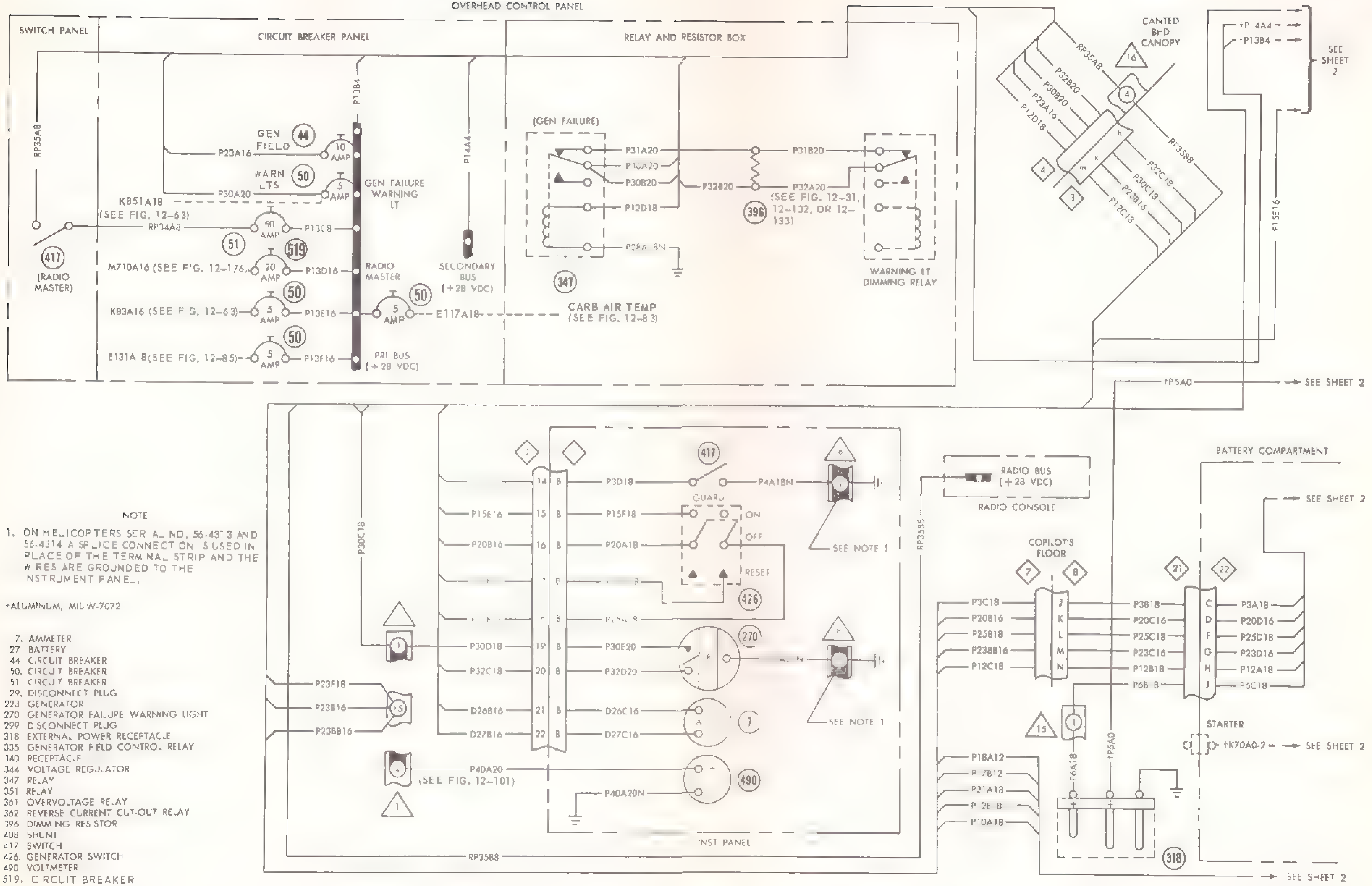


Figure 12–107. DC power (model CH-34A serial No. 54-3040 through 56-4312) (Sheet 1 of 2)



1ALUMINUM, MIL-W 7072

Figure 12–107. DC power (model CH 34A serial No. 54-3040 through 56 4312) (Sheet 2 of 2)



NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

+ALUMINUM, MIL-W-7072

7. AMMETER
27. BATTERY
44. CIRCUIT BREAKER
50. CIRCUIT BREAKER
51. CIRCUIT BREAKER
129. DISCONNECT PLUG
223. GENERATOR
270. GENERATOR FAILURE WARNING LIGHT
299. DISCONNECT PLUG
318. EXTERNAL POWER RECEPTACLE
335. GENERATOR FIELD CONTROL RELAY
340. RECEPTACLE
344. VOLTAGE REGULATOR
347. RELAY
351. RELAY
361. OVERVOLTAGE RELAY
362. REVERSE CURRENT CUT-OUT RELAY
396. DIMMING RESISTOR
408. SHUNT
417. SWITCH
426. GENERATOR SWITCH
490. VOLTMETER
519. CIRCUIT BREAKER

Figure 12-108. DC power (model CH-34A serial No. 56-4313 through 57-1741 and model CH 34C) (Sheet 1 of 2)

Figure 12–108. DC power (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C) (Sheet 2 of 2)

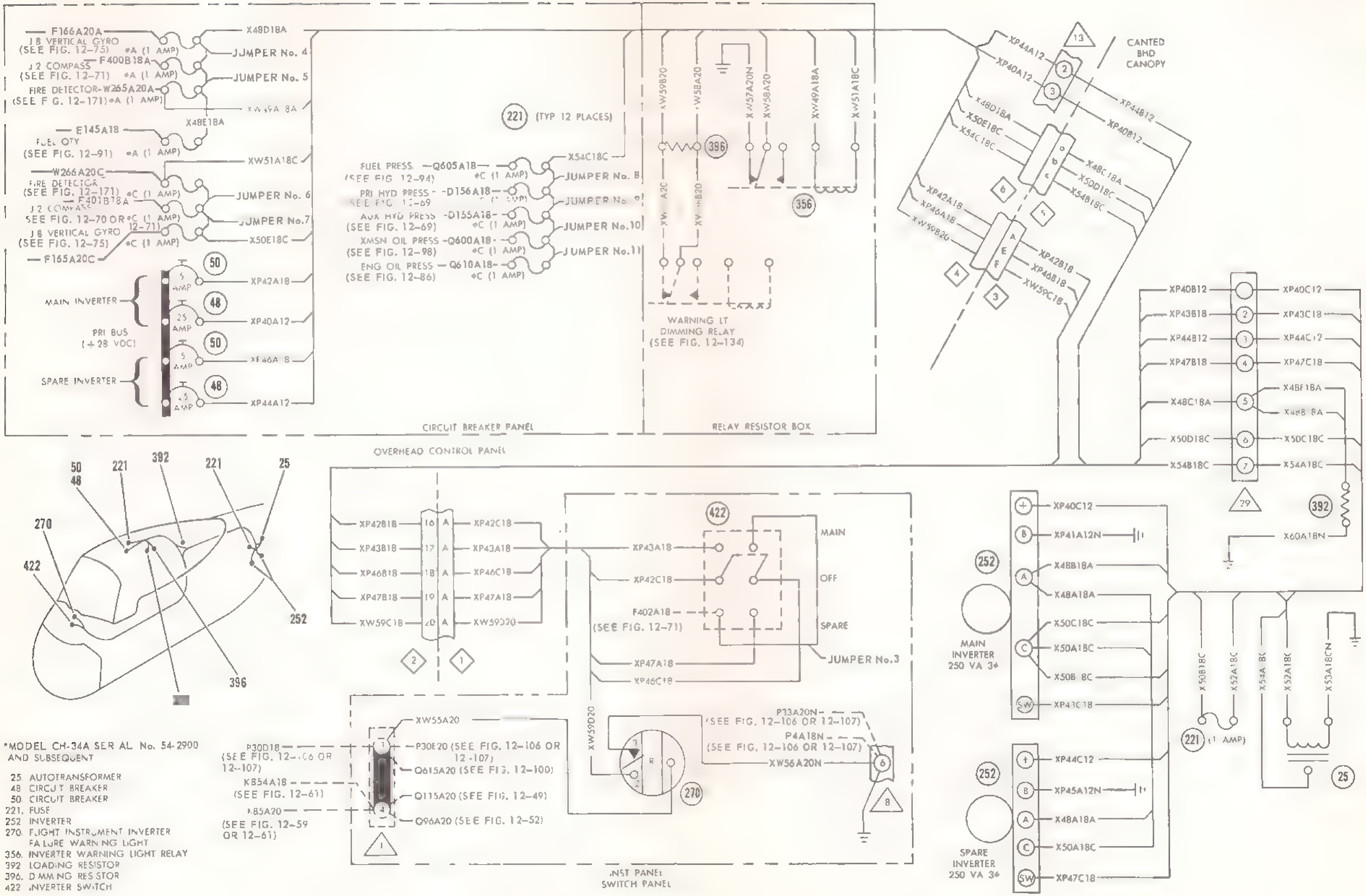
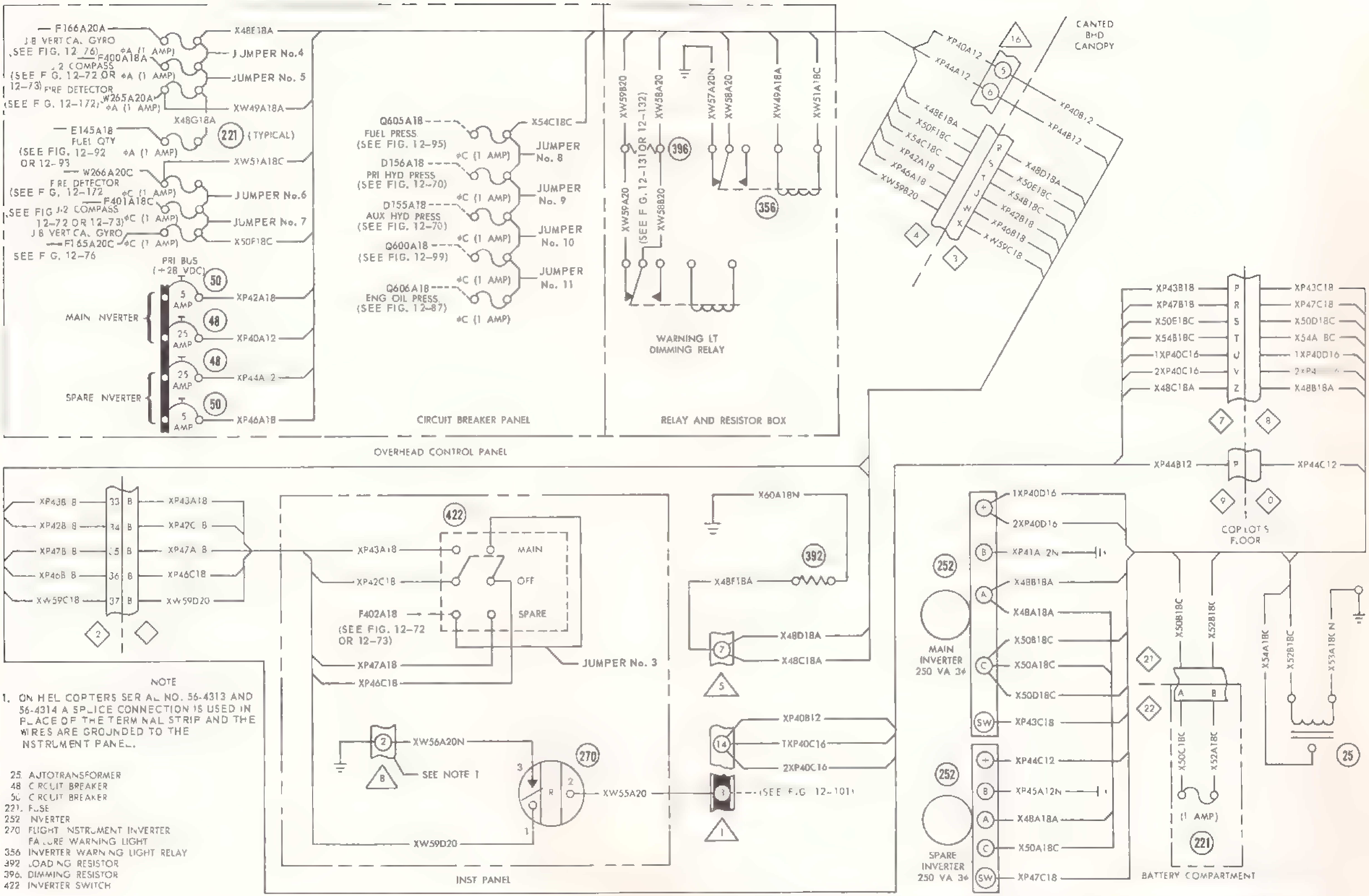


Figure 12—109. AC power (model CH-34A serial No. prior to 56-4313)



NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

25 AUTOTRANSFORMER
48 CIRCUIT BREAKER
50 CIRCUIT BREAKER
221 FUSE
252 INVERTER
270 FLIGHT INSTRUMENT INVERTER FAILURE WARNING LIGHT
356 INVERTER WARNING LIGHT RELAY
392 LOADING RESISTOR
396 DIMMING RESISTOR
422 INVERTER SWITCH

Figure 12–110. AC power (model CH 34A serial No. 56-4313 through 57-1741 and model CH-34C serial No. prior to 57 1742)

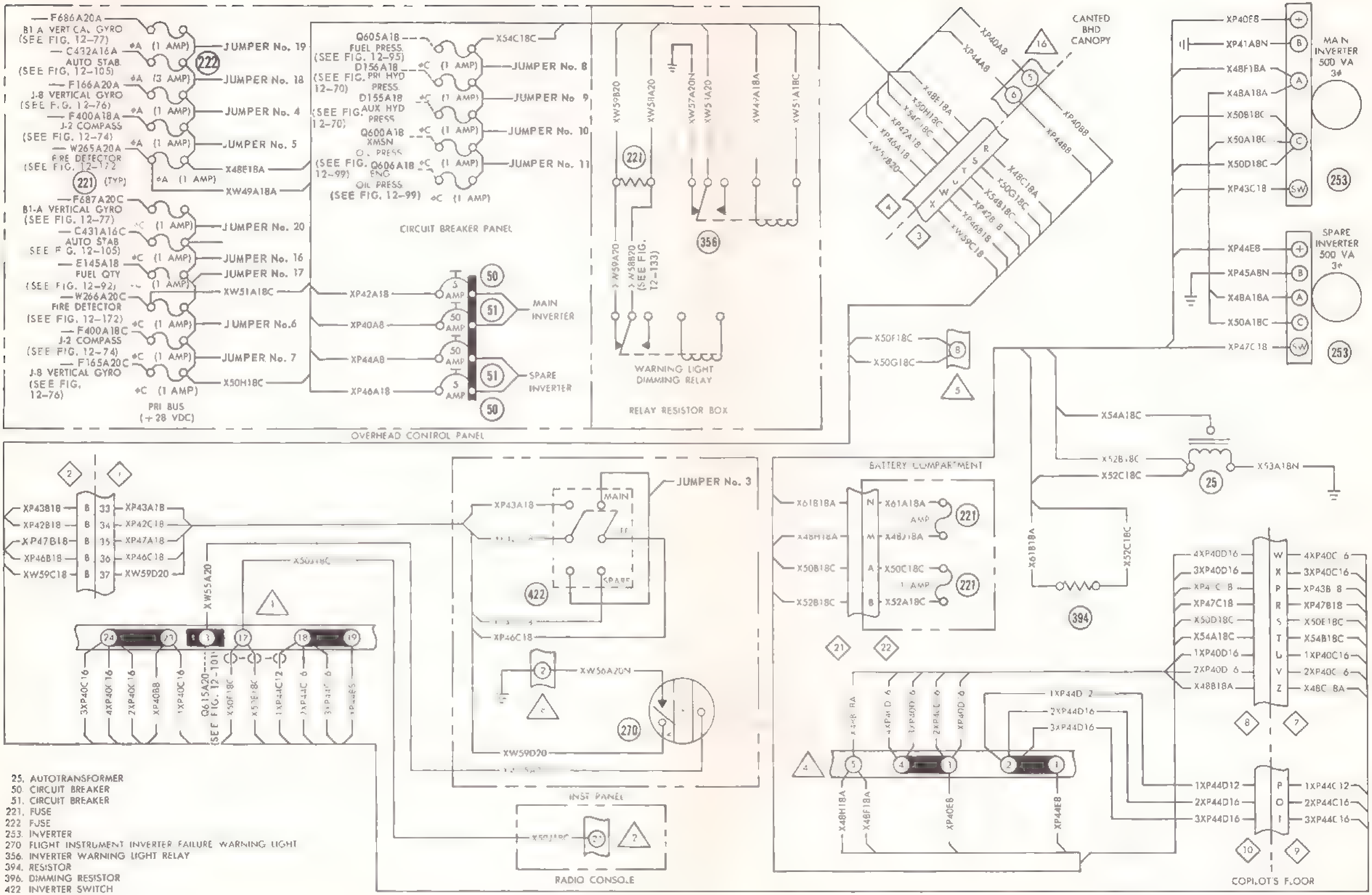
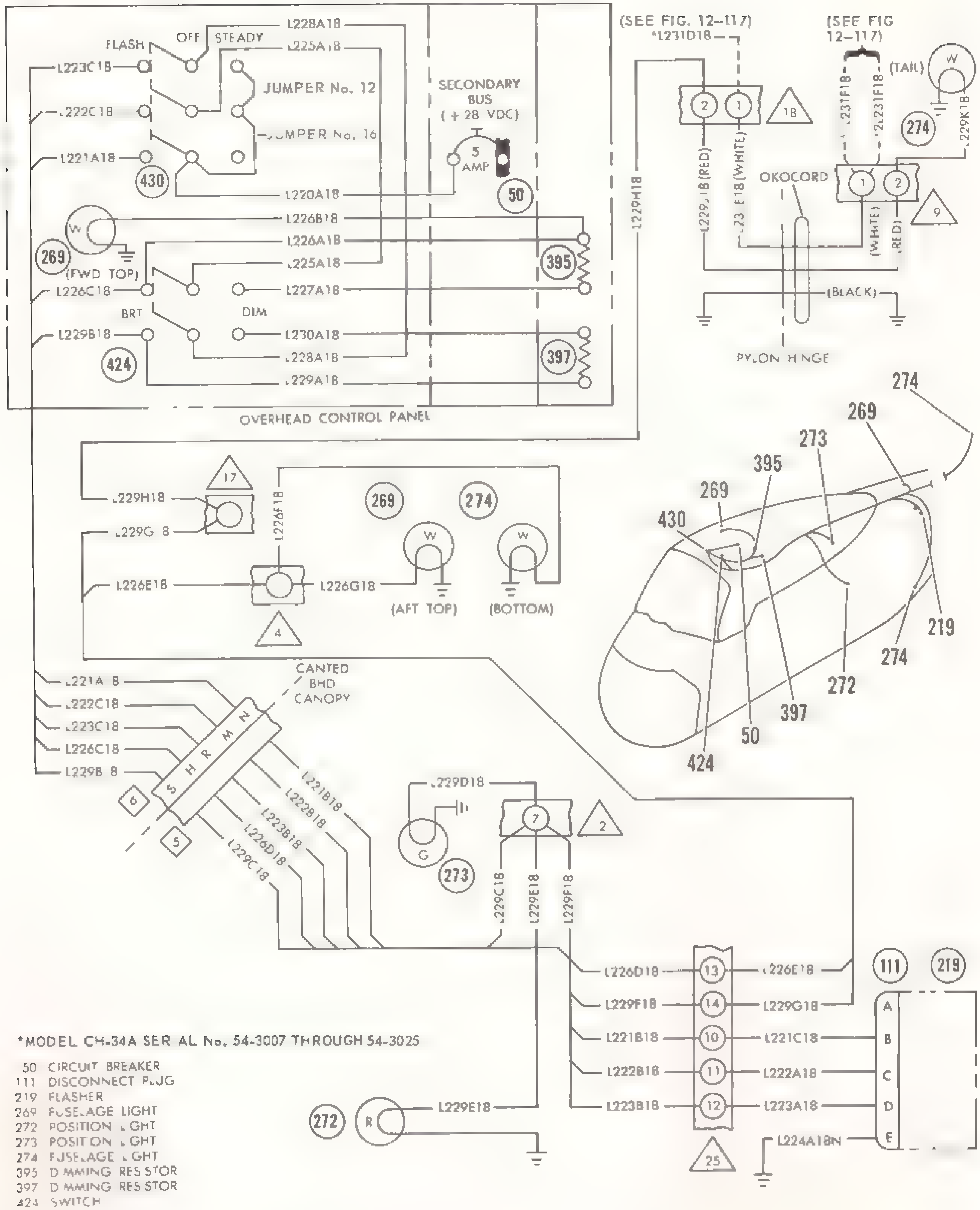


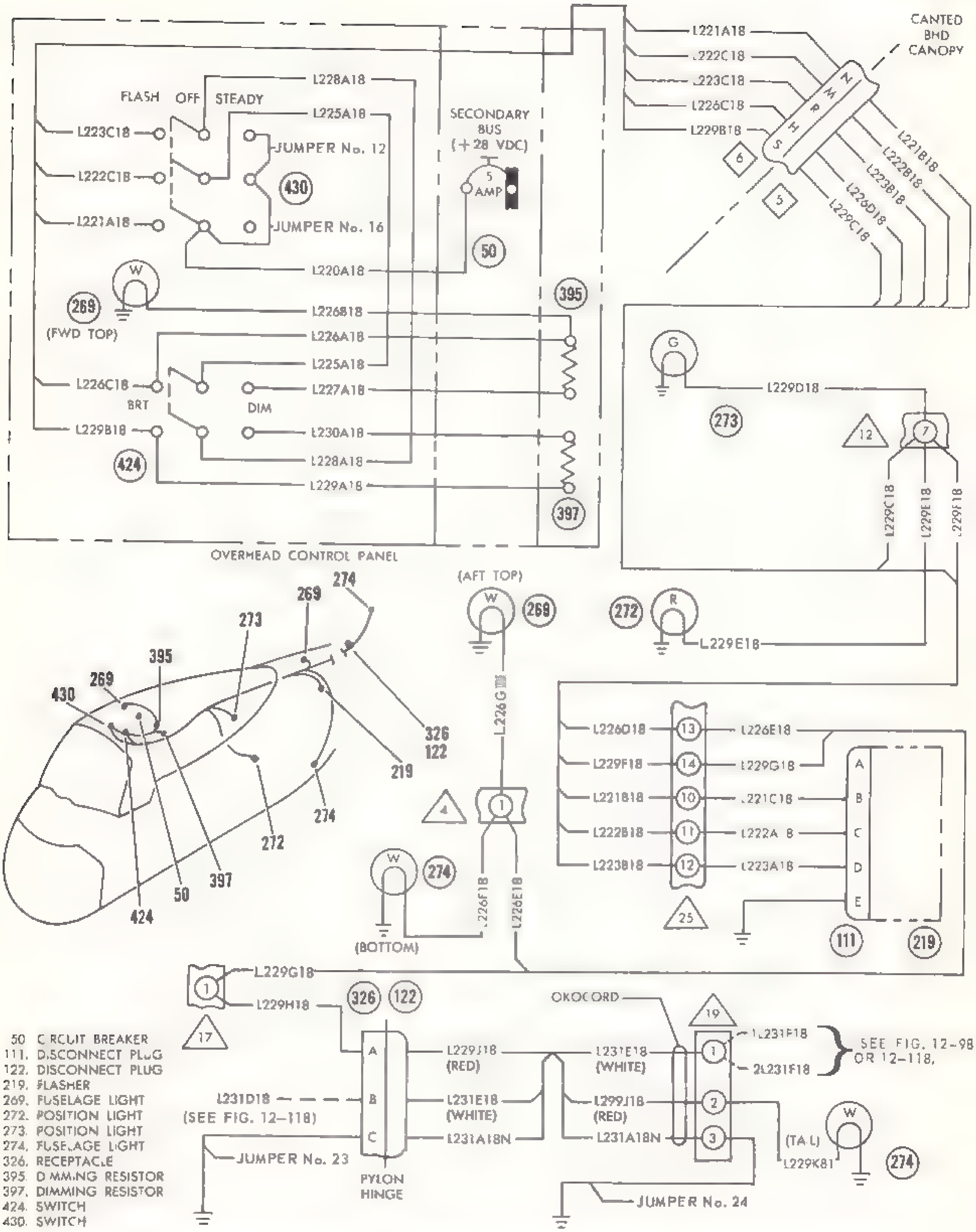
Figure 12—111. AC power (model CH-34C serial No. 57-1742 and subsequent)



*MODEL CH-34A SERIAL No. 54-3007 THROUGH 54-3025

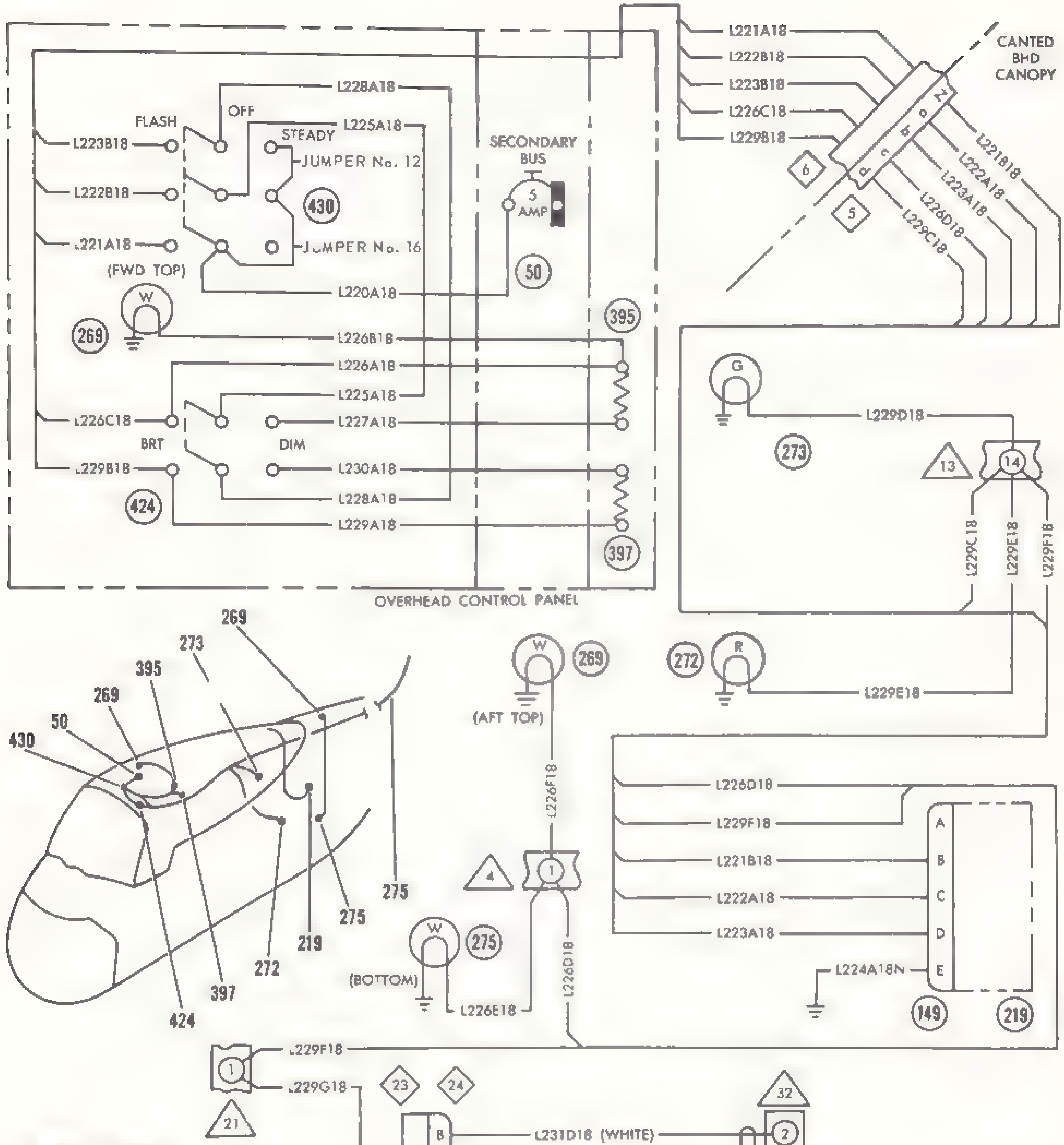
50 CIRCUIT BREAKER
111 DISCONNECT PLUG
219 FLASHER
269 FUSELAGE LIGHT
272 POSITION LIGHT
273 POSITION LIGHT
274 FUSELAGE LIGHT
395 DIMMING RESISTOR
397 DIMMING RESISTOR
424 SWITCH
430 SWITCH

Figure 12–112. Navigation lights (position and fuselage) (model CH-34A serial No. prior to 54-3026)



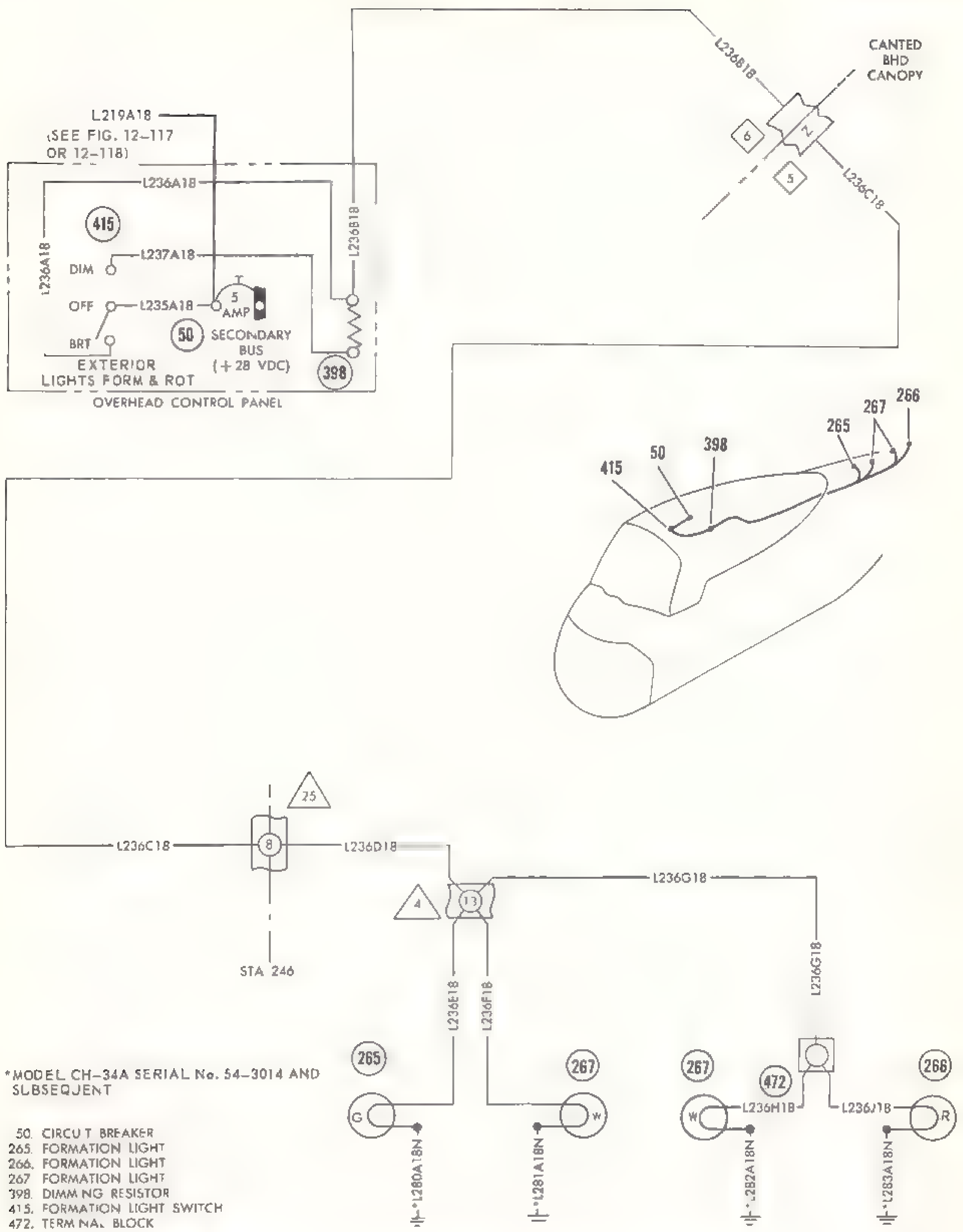
50. CIRCUIT BREAKER
111. DISCONNECT PLUG
122. DISCONNECT PLUG
219. FLASHER
269. FUSELAGE LIGHT
272. POSITION LIGHT
273. POSITION LIGHT
274. FUSELAGE LIGHT
326. RECEPTACLE
395. DIMMING RESISTOR
397. DIMMING RESISTOR
424. SWITCH
430. SWITCH

Figure 12–113 Navigation lights (position and fuselage) (model CH-34A serial No. 54-3026 through 56-4312)



50. CIRCUIT BREAKER
149. DISCONNECT PLUG
219. FLASHER
269. FUSELAGE LIGHT
272. POSITION LIGHT
273. POSITION LIGHT
275. FUSELAGE LIGHT
395. DIMMING RESISTOR
397. DIMMING RESISTOR
424. SWITCH
430. SWITCH

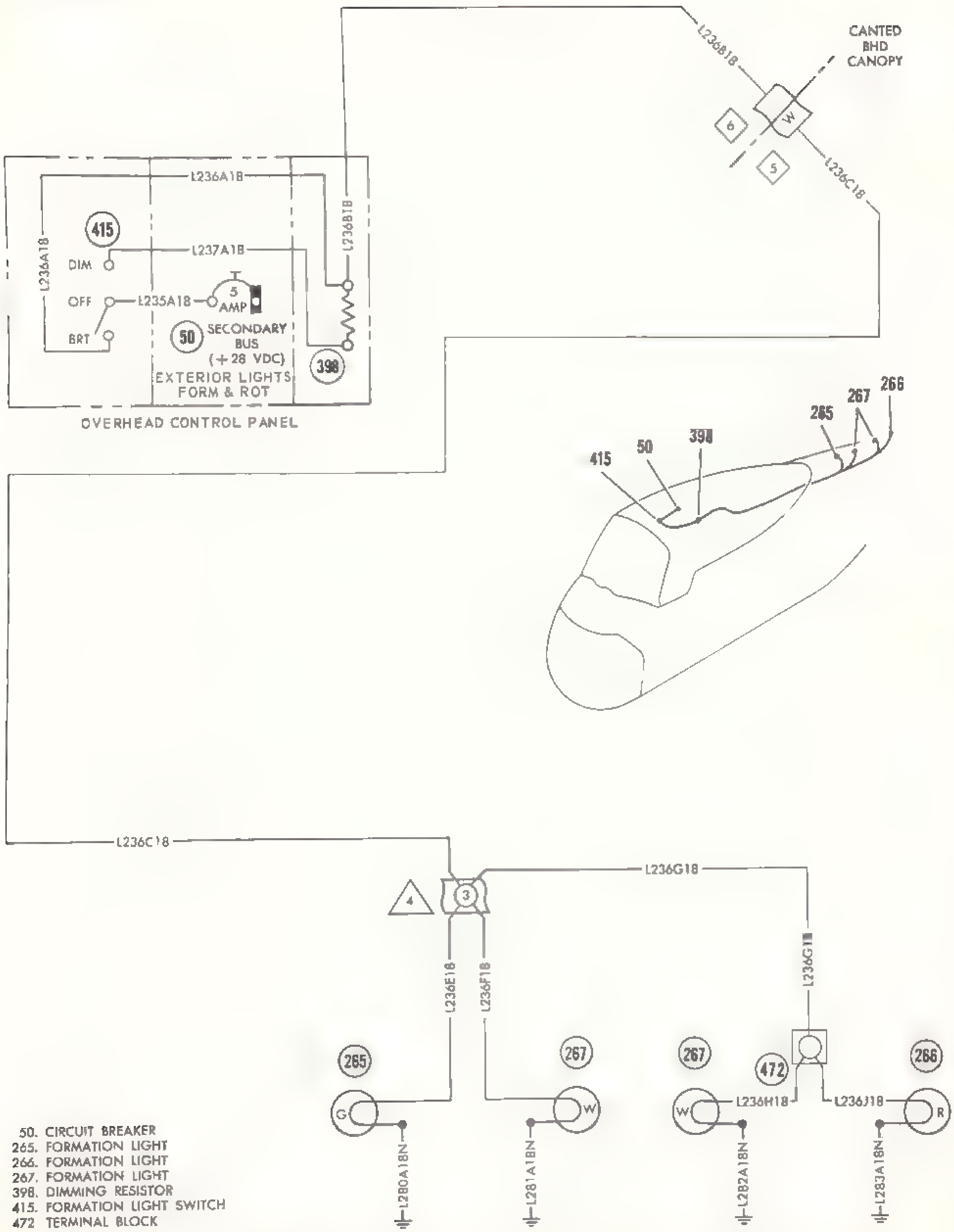
Figure 12–114. Navigation lights (position and fuselage) (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



*MODEL CH-34A SERIAL No. 54-3014 AND SUBSEQUENT

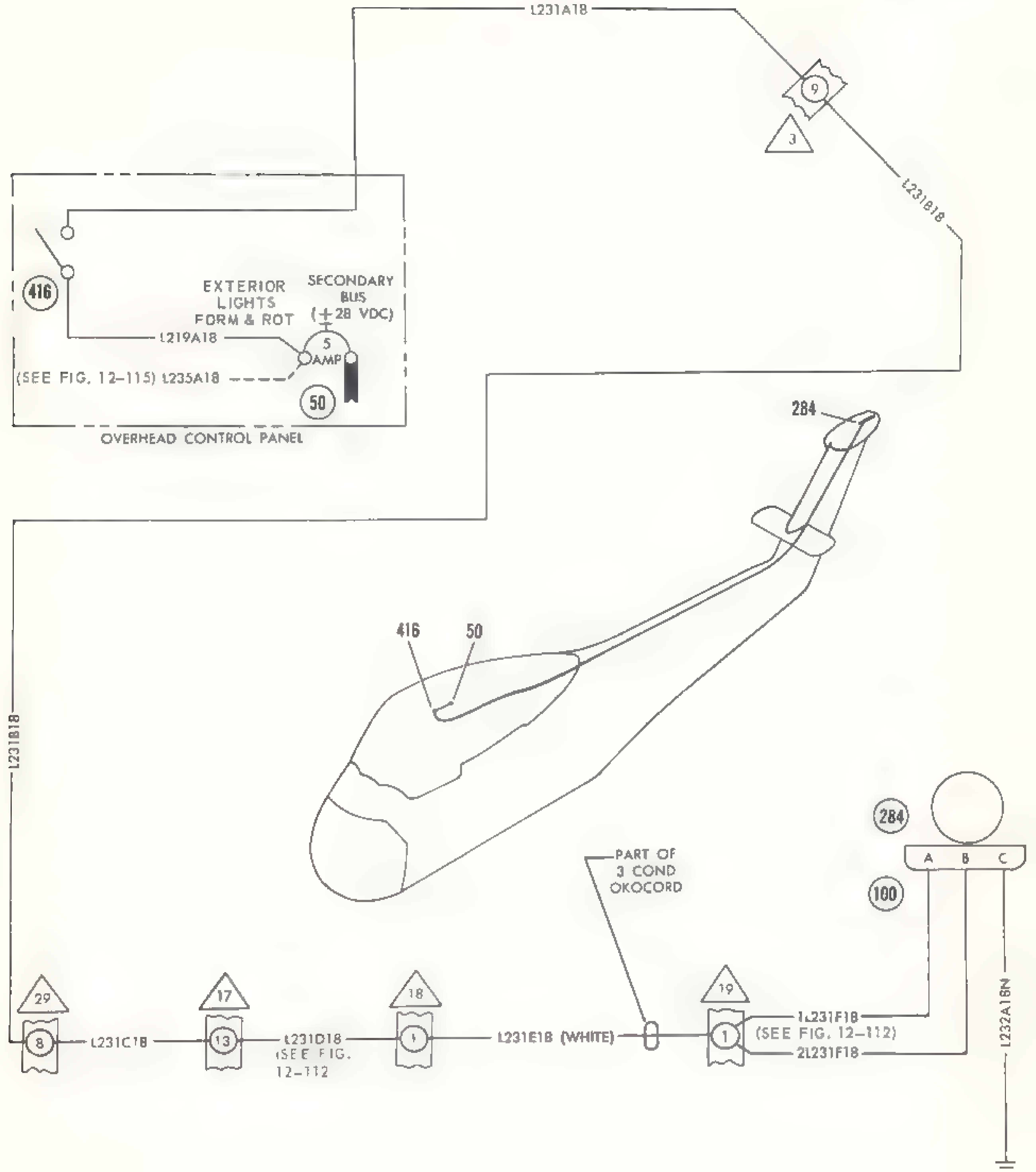
50. CIRCUIT BREAKER
265. FORMATION LIGHT
266. FORMATION LIGHT
267. FORMATION LIGHT
398. DIMMING RESISTOR
415. FORMATION LIGHT SWITCH
472. TERMINAL BLOCK

Figure 12–115. Formation lights (model CH-34A serial No. prior to 56-4313)



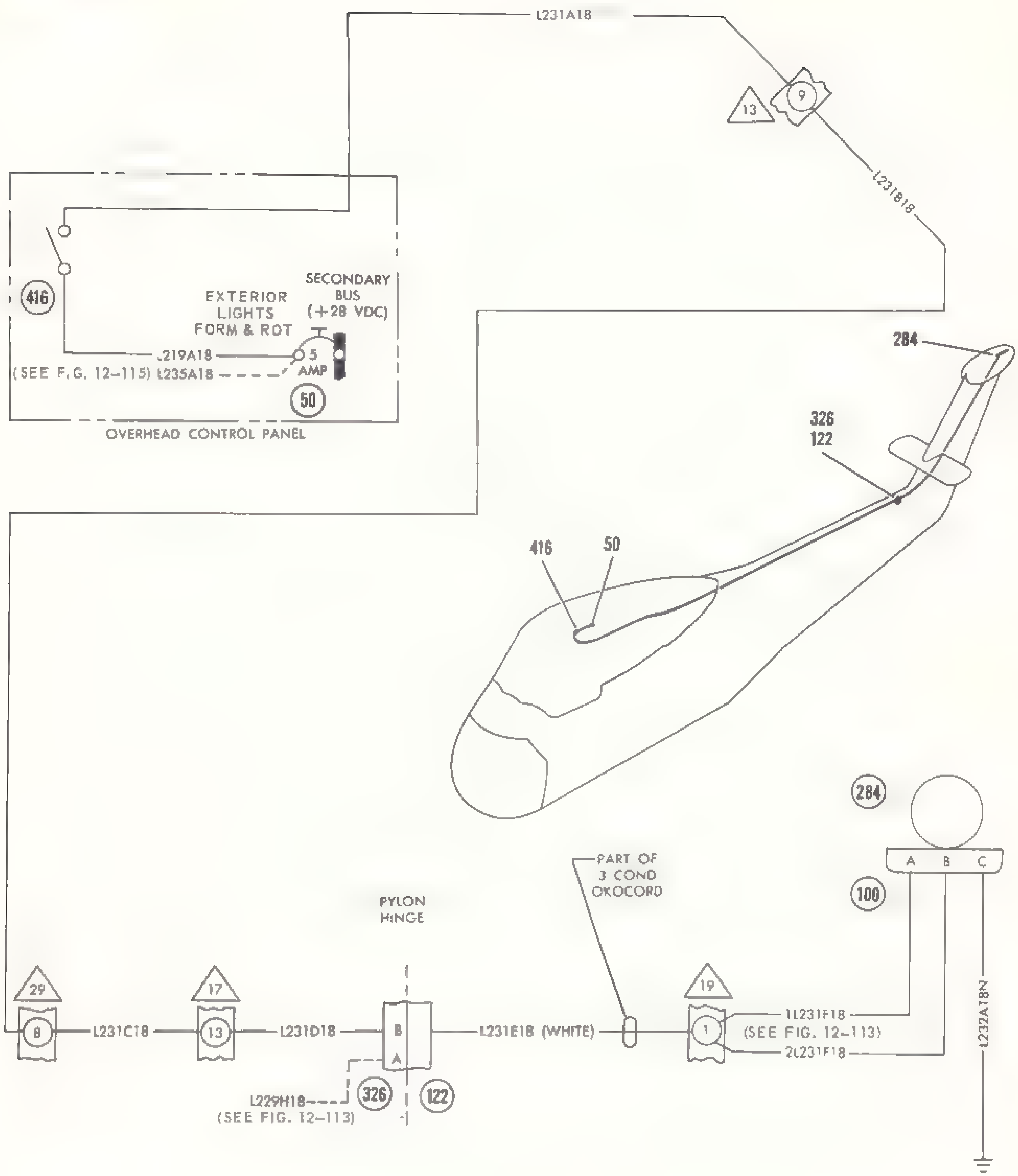
50. CIRCUIT BREAKER
265. FORMATION LIGHT
266. FORMATION LIGHT
267. FORMATION LIGHT
398. DIMMING RESISTOR
415. FORMATION LIGHT SWITCH
472 TERMINAL BLOCK

Figure 12—116. Formation lights (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



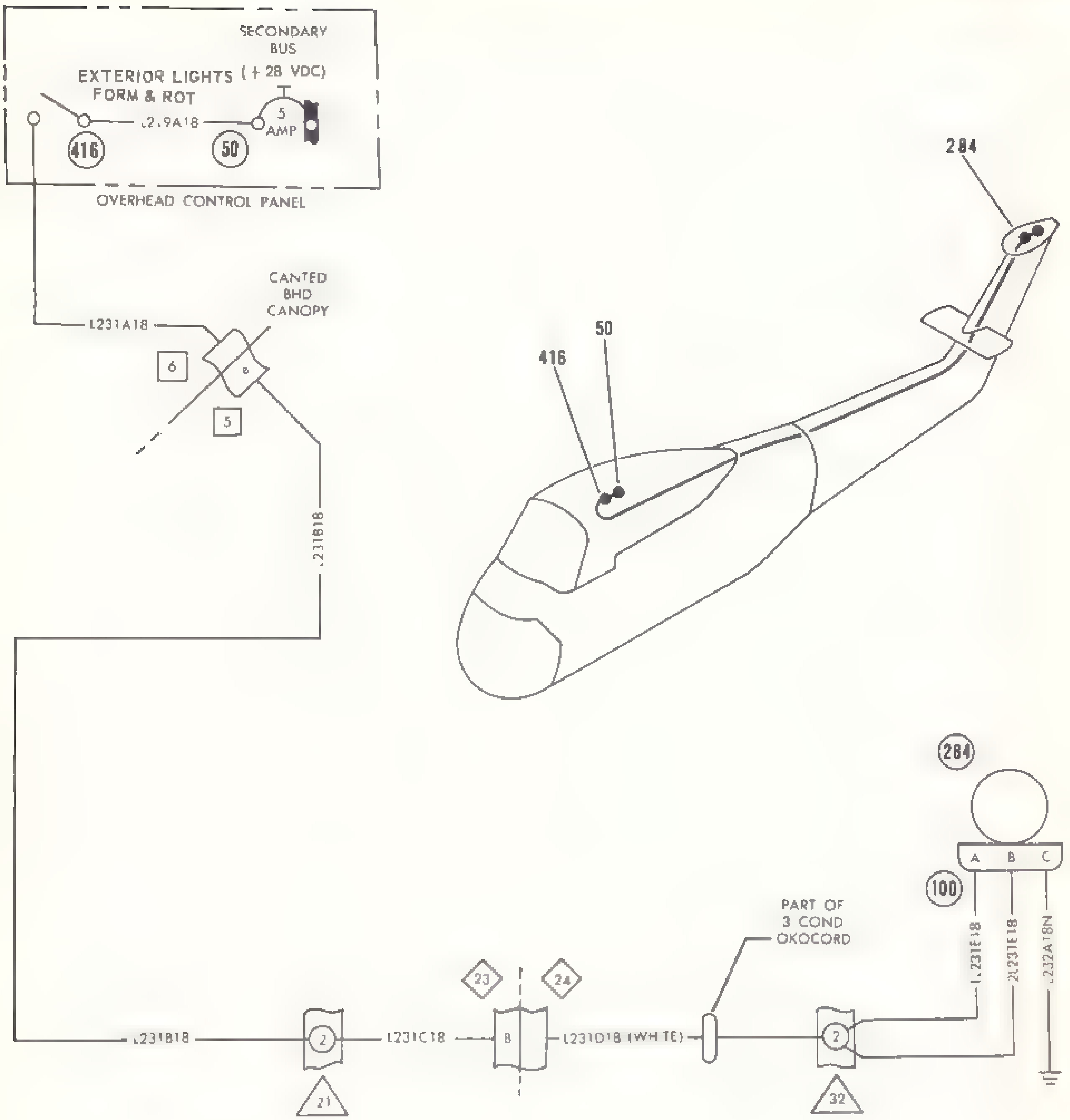
50. CIRCUIT BREAKER
100. DISCONNECT PLUG
284. ROTATING LIGHT
416. ROTATING LIGHT SWITCH

Figure 12–117. Rotating light (model CH-34A serial No. prior to 54-3026)



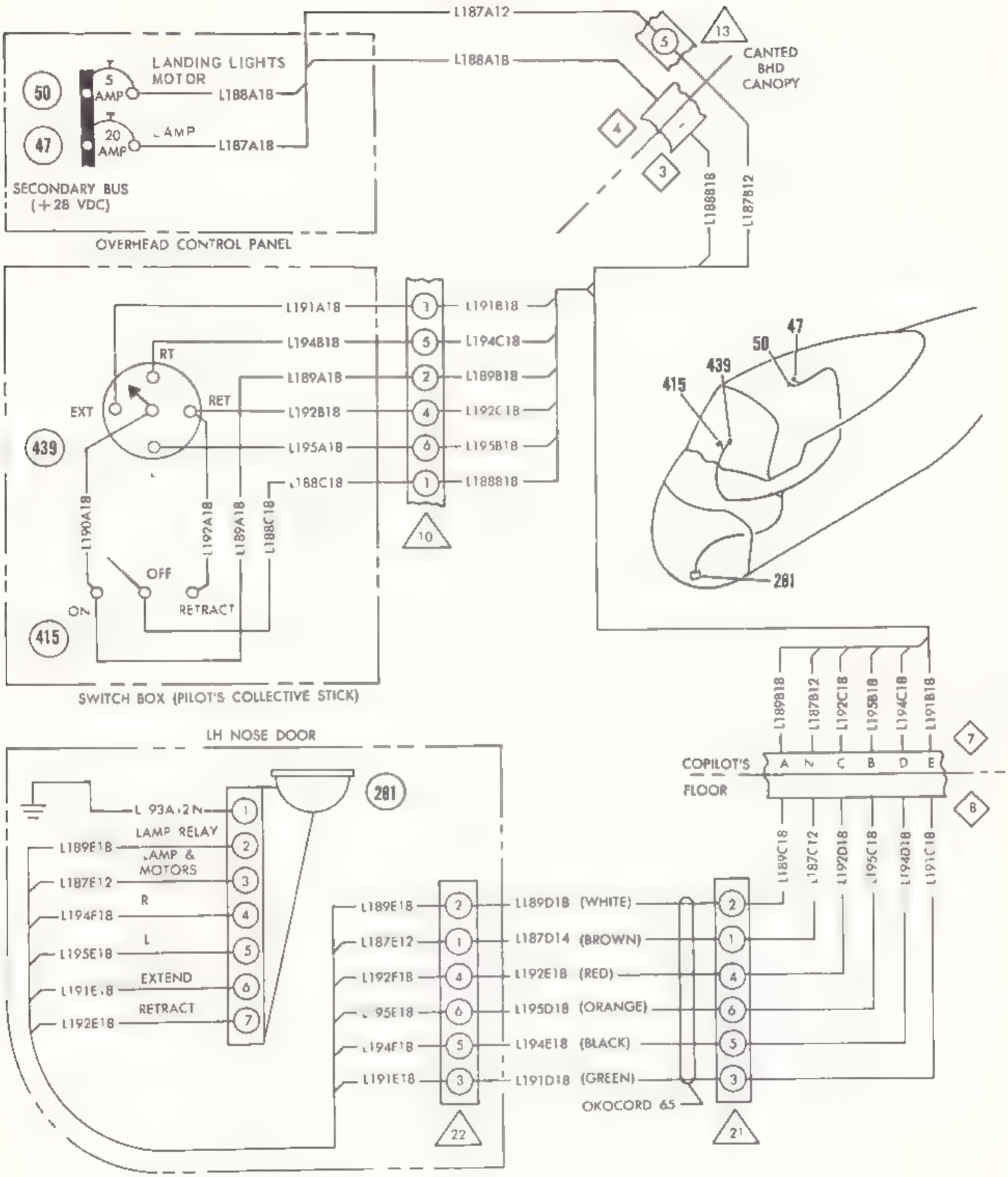
50. CIRCUIT BREAKER
100. DISCONNECT PLUG
122. DISCONNECT PLUG
284. ROTATING LIGHT
326. RECEPTACLE
416. ROTATING LIGHT SWITCH

Figure 12-118. Rotating light (model CH-34A serial No. 54-3026 through 56-4312)



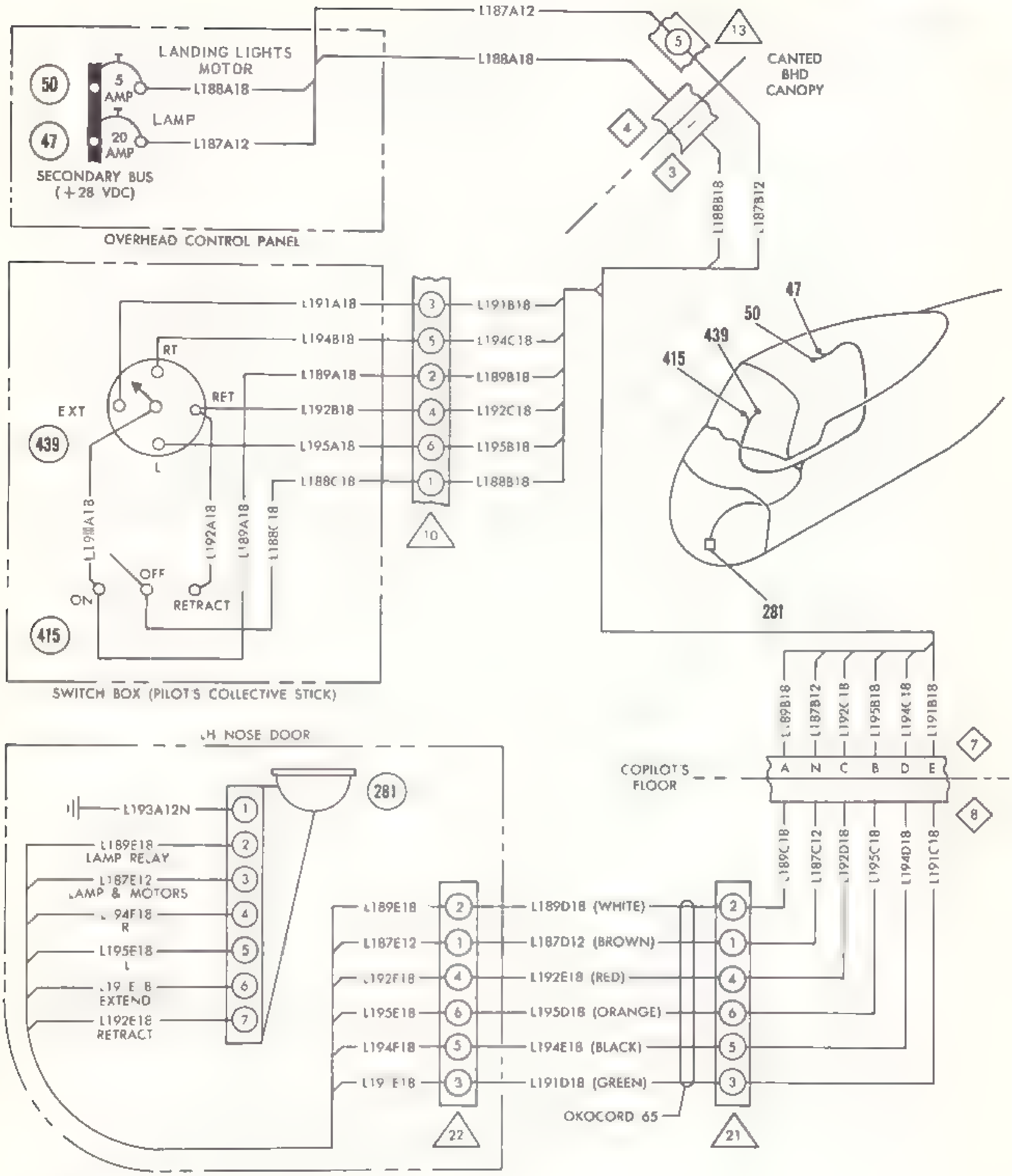
50 CIRCUIT BREAKER
100 DISCONNECT PLUG
284 ROTATING LIGHT
416 ROTATING LIGHT SWITCH

Figure 12–119. Rotating light (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



47 CIRCUIT BREAKER
50. CIRCUIT BREAKER
281. SWIVEL TYPE LANDING LIGHT
415. LIGHT SWITCH
439 LIGHT CONTROL SWITCH

Figure 12–120. Landing light (model CH-34A serial No. prior to 54-922)



47 CIRCUIT BREAKER
50 CIRCUIT BREAKER
281 LANDING LIGHT
415 LIGHT SWITCH
439 LIGHT CONTROL SWITCH

Figure 12—121. Landing light (model CH-34A serial No. 54-922 through 56-4312)

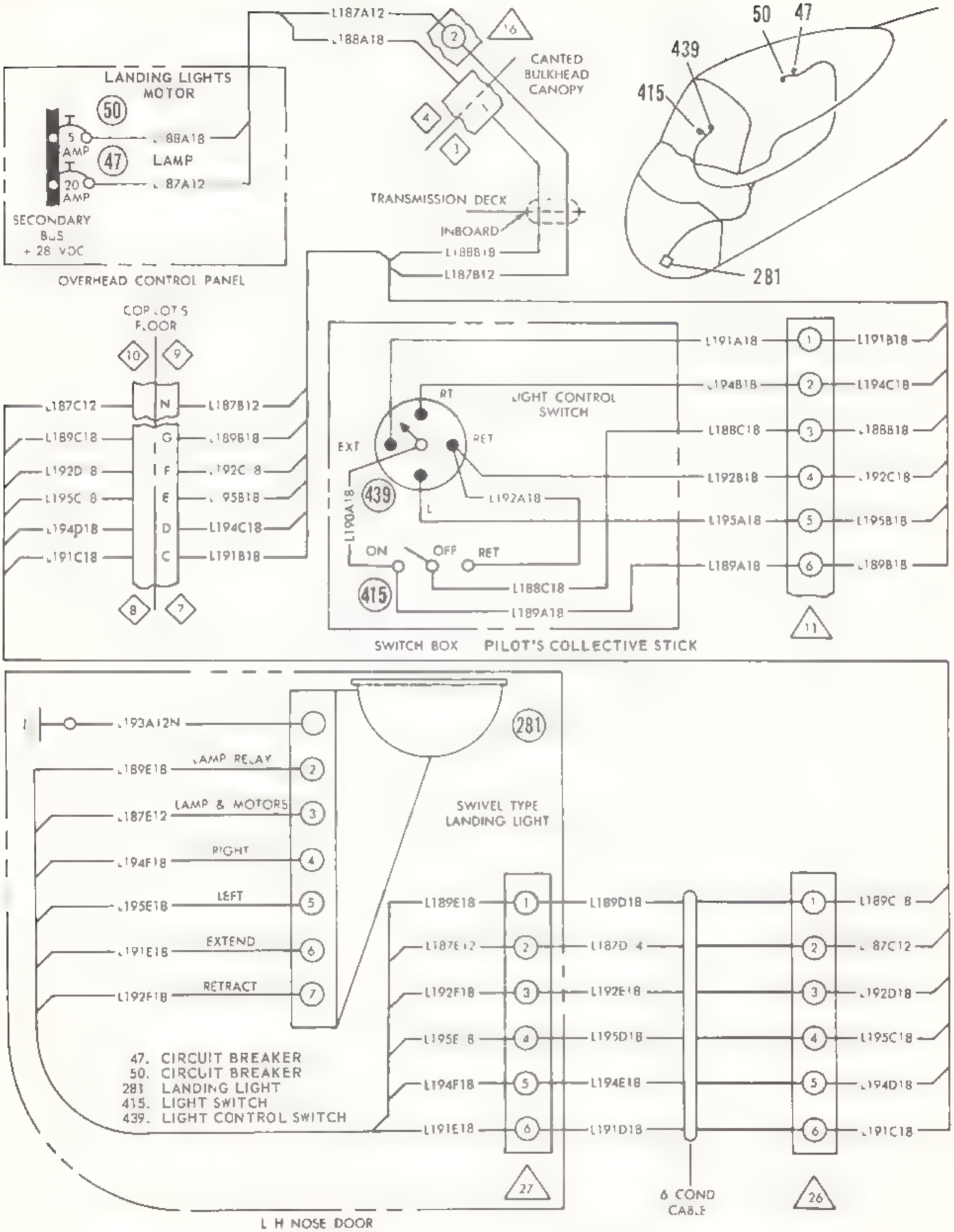
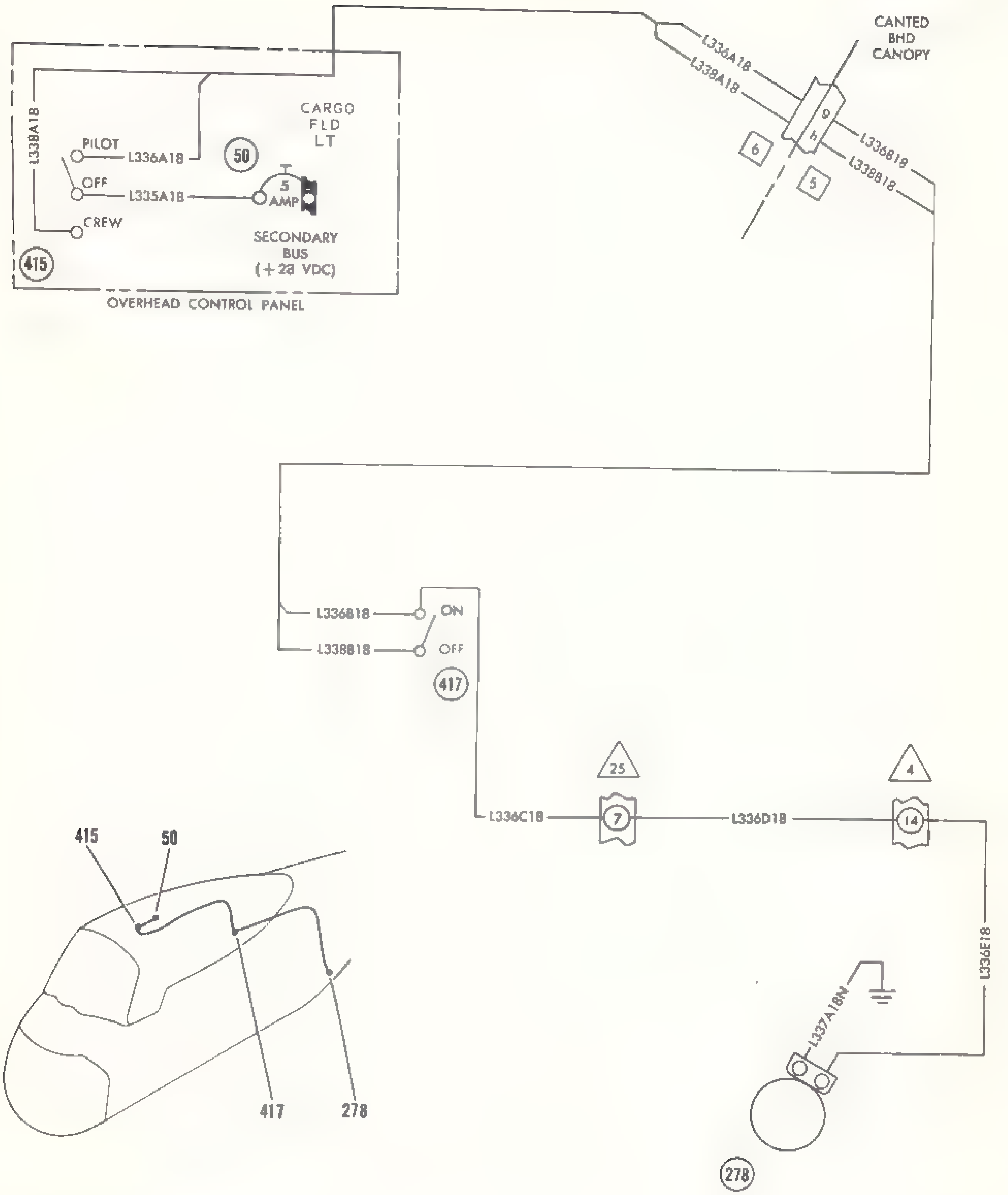
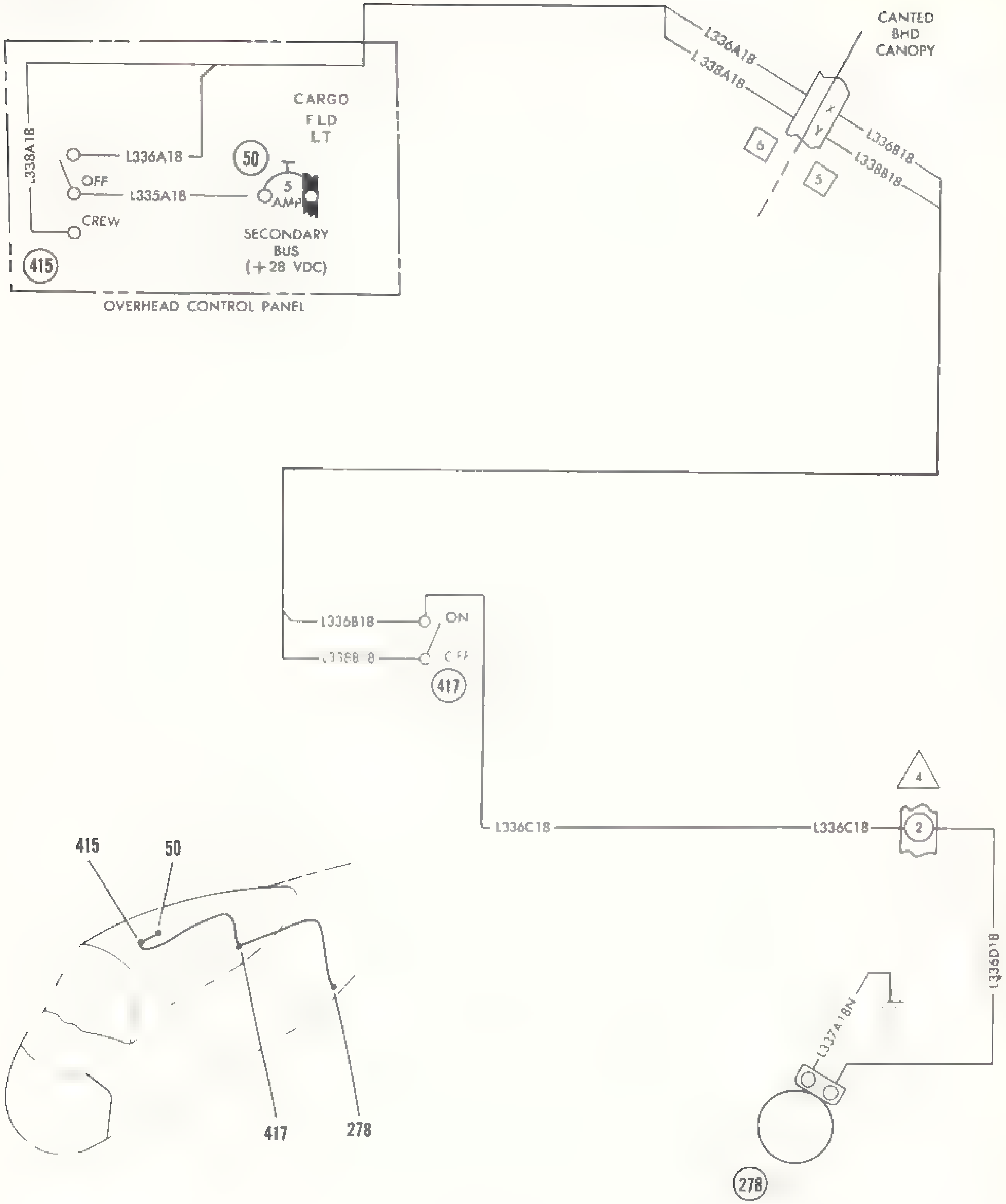


Figure 12–122. Landing light (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



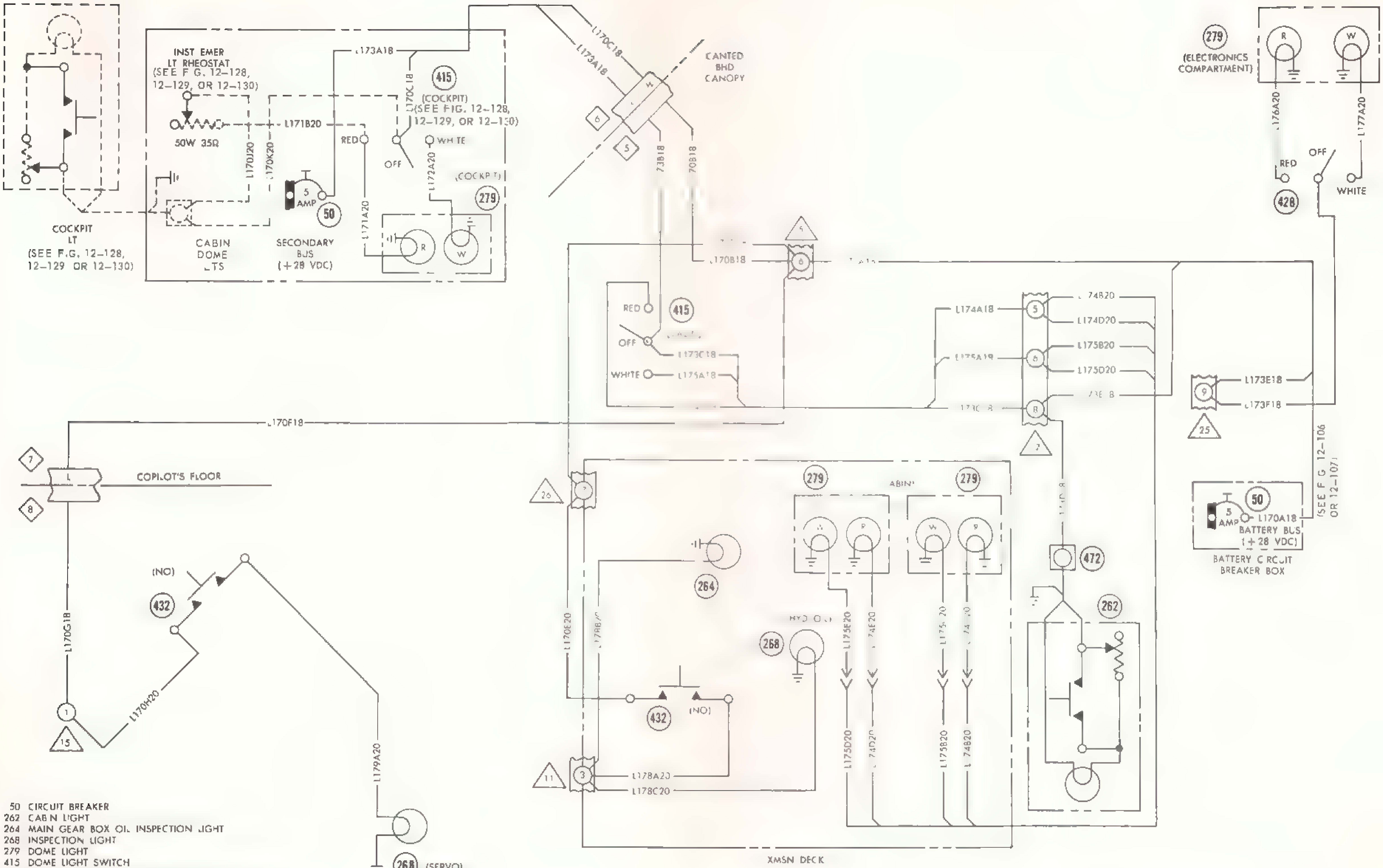
50. CIRCUIT BREAKER
278. CARGO FLOOD LIGHT
415. PILOT'S CARGO FLOOD LIGHT SWITCH
417. CREW'S CARGO FLOOD LIGHT SWITCH

Figure 12–123. Cargo floodlight (model CH-34A serial No. prior to 56-4313)



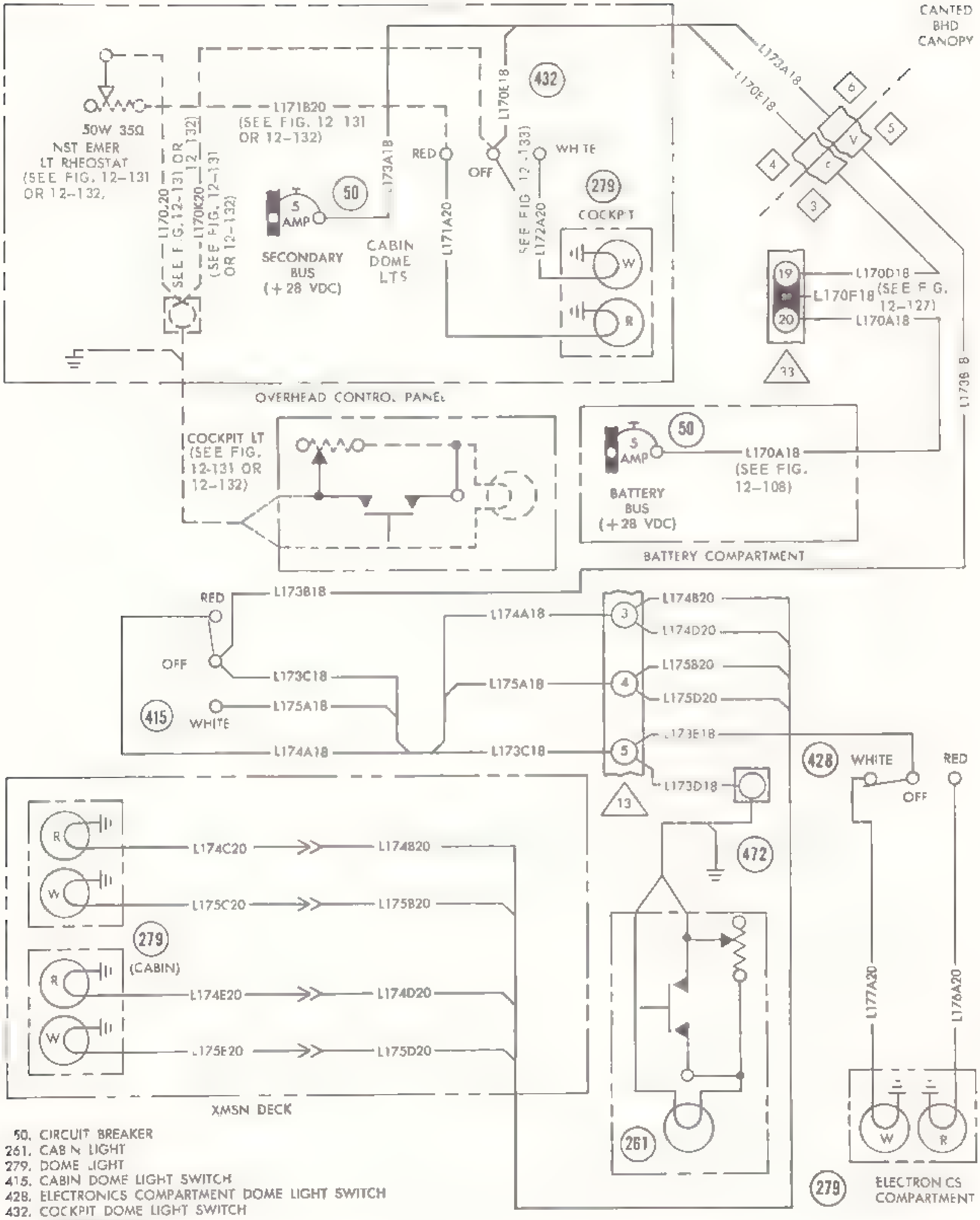
50. CIRCUIT BREAKER
278. CARGO FLOOD LIGHT
415. PILOT'S CARGO FLOOD LIGHT SWITCH
417. CREW'S CARGO FLOOD LIGHT SWITCH

Figure 12–124. Cargo floodlight (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



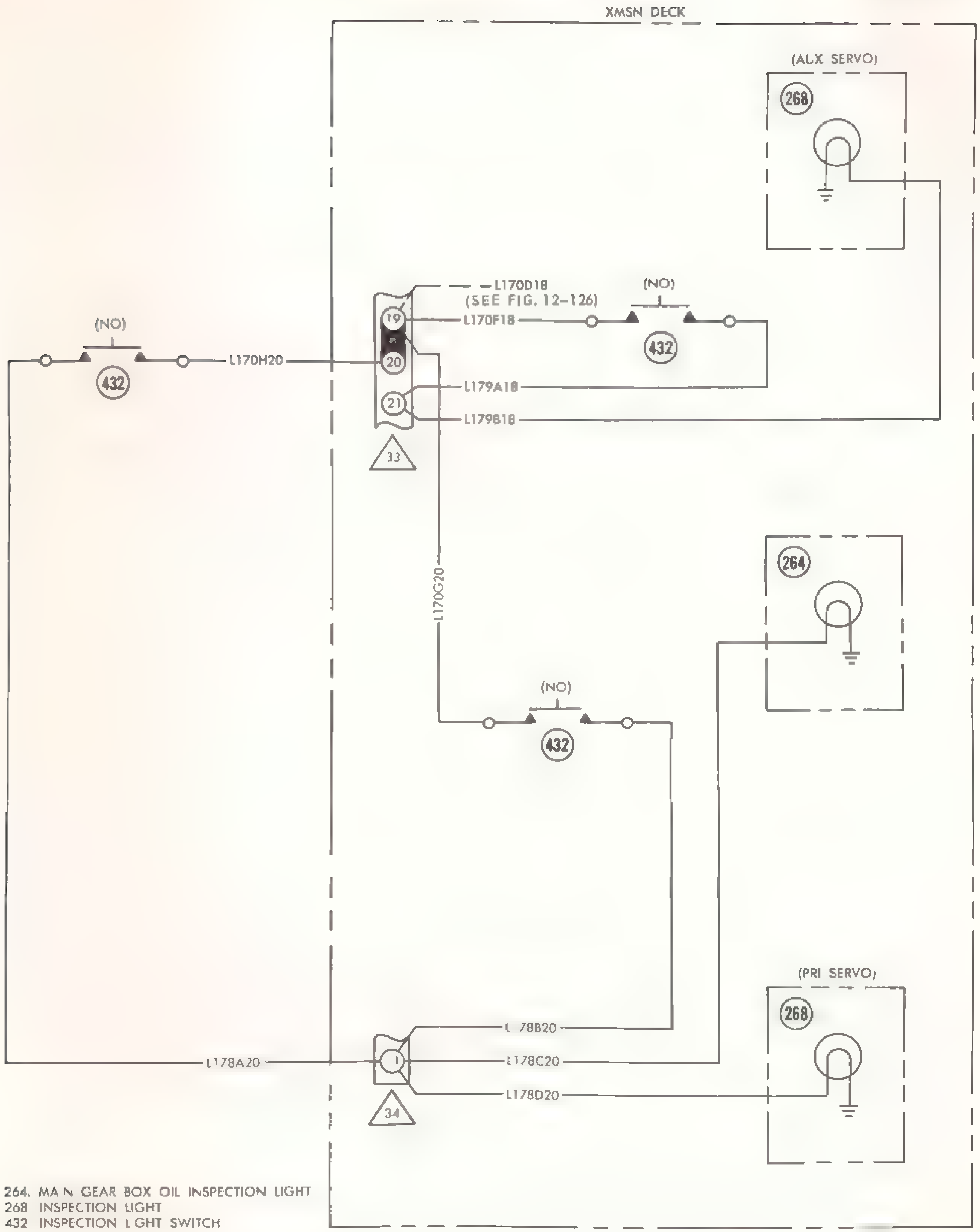
50 CIRCUIT BREAKER
262 CABIN LIGHT
264 MAIN GEAR BOX OIL INSPECTION LIGHT
268 INSPECTION LIGHT
279 DOME LIGHT
415 DOME LIGHT SWITCH
428 ELECTRONICS COMPARTMENT DOME LIGHT SWITCH
432 INSPECTION LIGHT SWITCH
472 TERMINAL BLOCK

Figure 12-125. Dome lights, inspection lights, and trouble lights (model CH-34A serial No. prior to 56-4313)



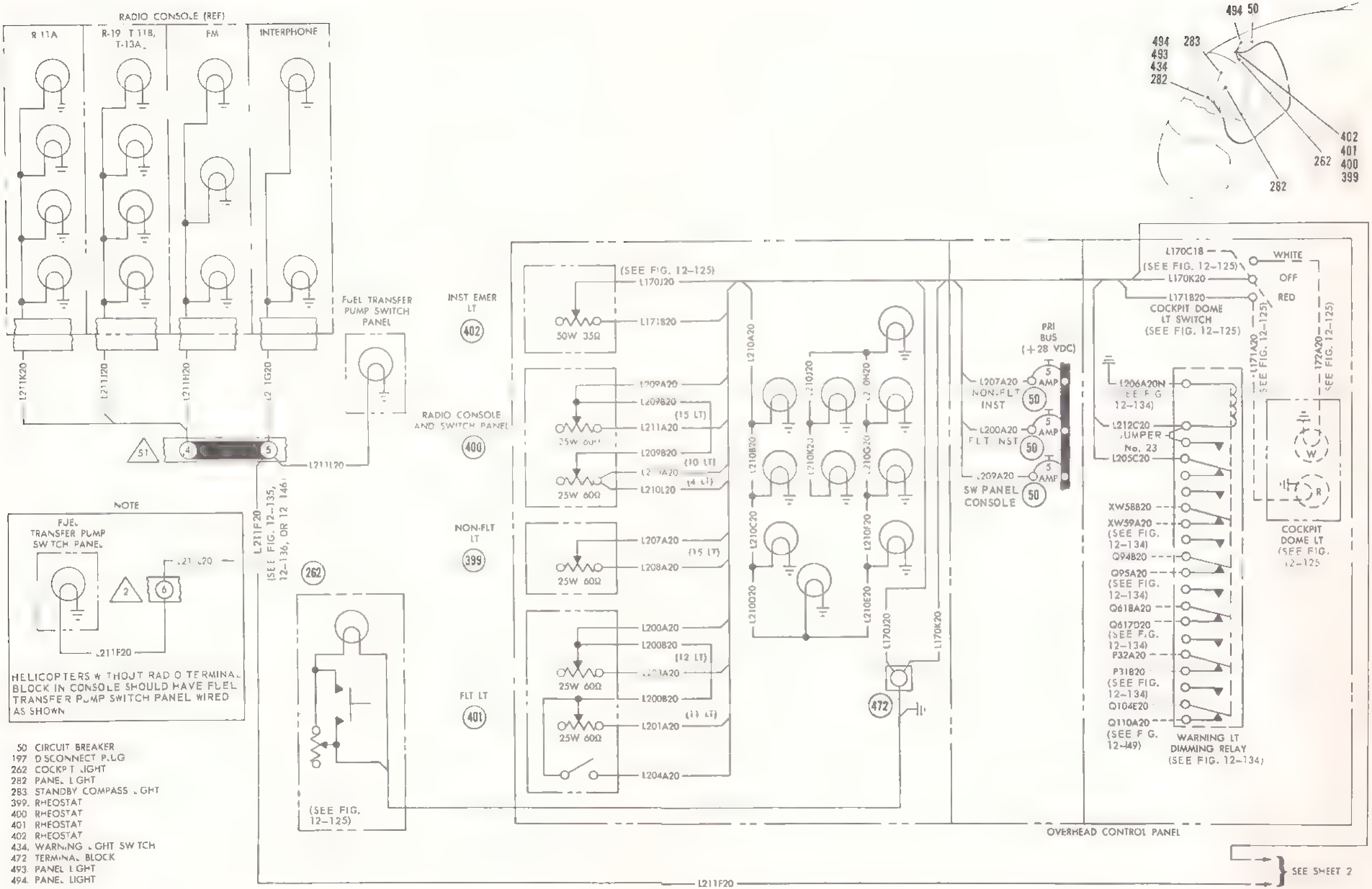
50. CIRCUIT BREAKER
261. CABIN LIGHT
279. DOME LIGHT
415. CABIN DOME LIGHT SWITCH
428. ELECTRONICS COMPARTMENT DOME LIGHT SWITCH
432. COCKPIT DOME LIGHT SWITCH
472. TERMINAL BLOCK

Figure 12–126. Dome lights and trouble lights (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



264. MAIN GEAR BOX OIL INSPECTION LIGHT
268 INSPECTION LIGHT
432 INSPECTION LIGHT SWITCH

Figure 12–127. Inspection lights (model CH 34A serial No. 56-4313 through 57-1741 and model CH-34C)



50 CIRCUIT BREAKER
197 DISCONNECT PLUG
262 COCKPIT LIGHT
282 PANEL LIGHT
283 STANDBY COMPASS LIGHT
399 RHEOSTAT
400 RHEOSTAT
401 RHEOSTAT
402 RHEOSTAT
434 WARNING LIGHT SWITCH
472 TERMINAL BLOCK
493 PANEL LIGHT
494 PANEL LIGHT

Figure 12–128. Console, panel, and instrument lights (model CH-34A serial No. prior to 54-3000) (Sheets 1 of 2)

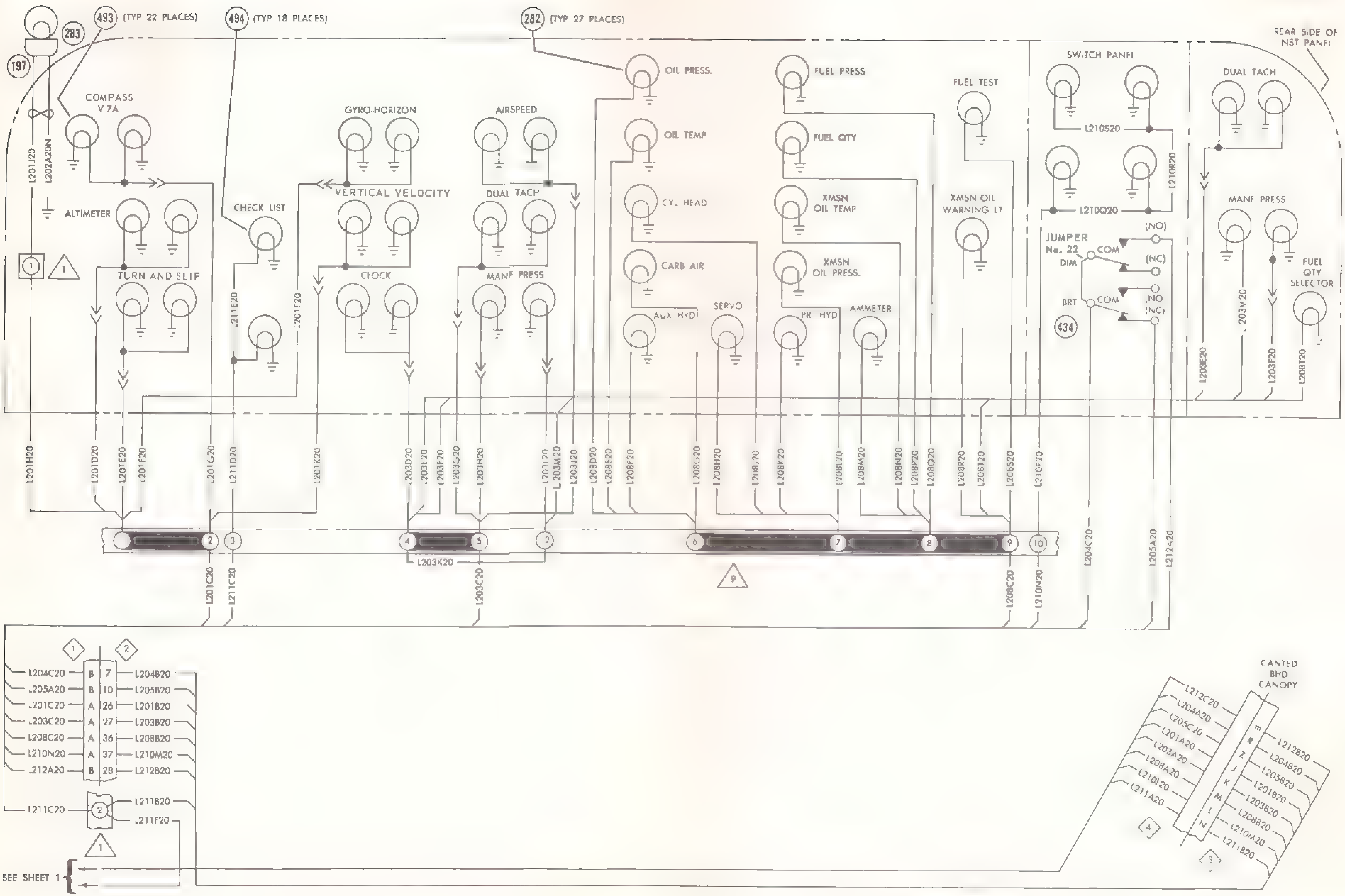
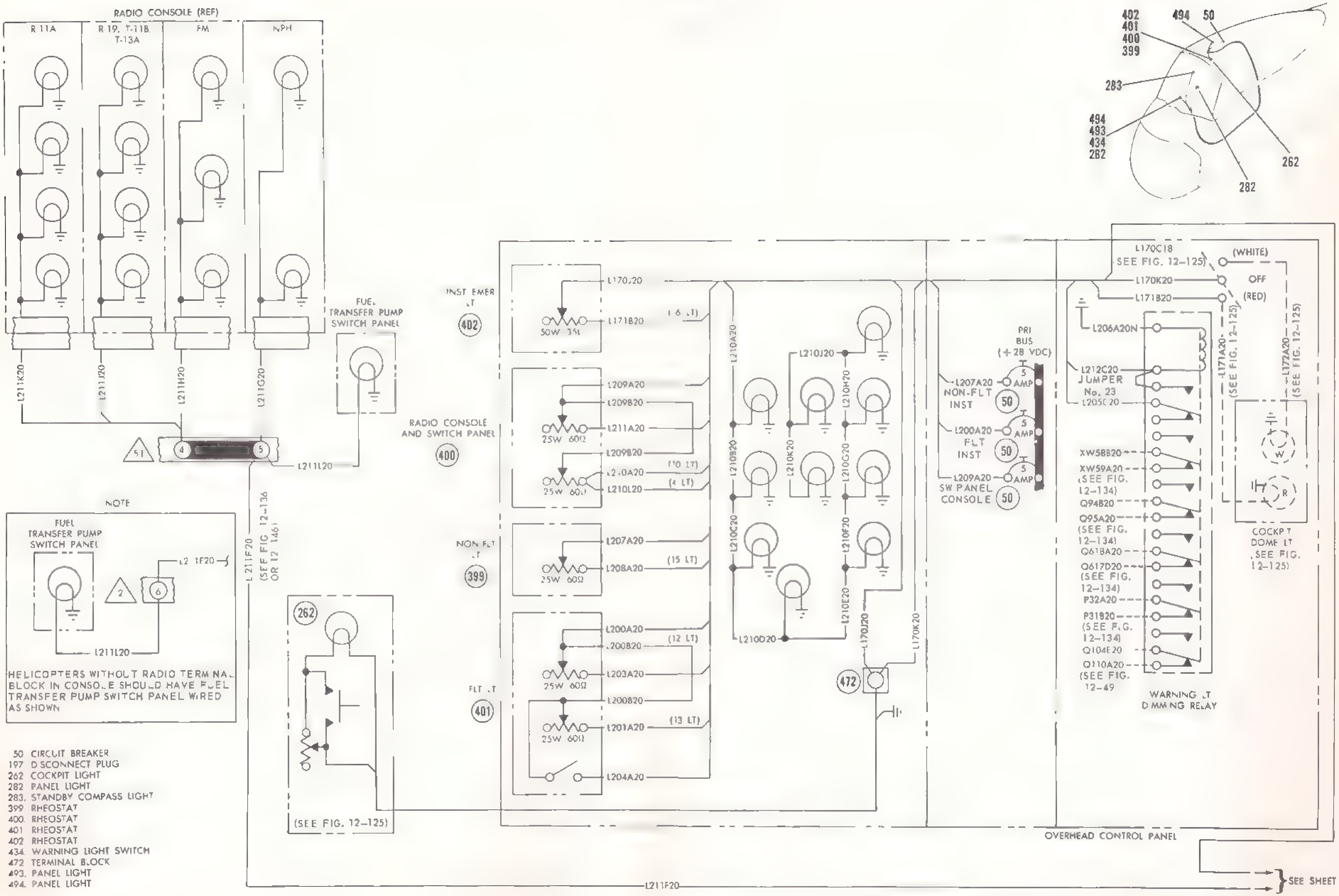


Figure 12–128. Console, panel, and instrument lights (model CH-34A serial No. prior to 54-3000) (Sheet 2 of 2)



50 CIRCUIT BREAKER
197 DISCONNECT PLUG
262 COCKPIT LIGHT
282 PANEL LIGHT
283. STANDBY COMPASS LIGHT
399 RHEOSTAT
400. RHEOSTAT
401 RHEOSTAT
402 RHEOSTAT
434. WARNING LIGHT SWITCH
472 TERMINAL BLOCK
493. PANEL LIGHT
494. PANEL LIGHT

Figure 12–129. Console, panel, and instrument lights (model CH-34A serial No. 54-3000 through 54-3033) (Sheet 1 of 2)

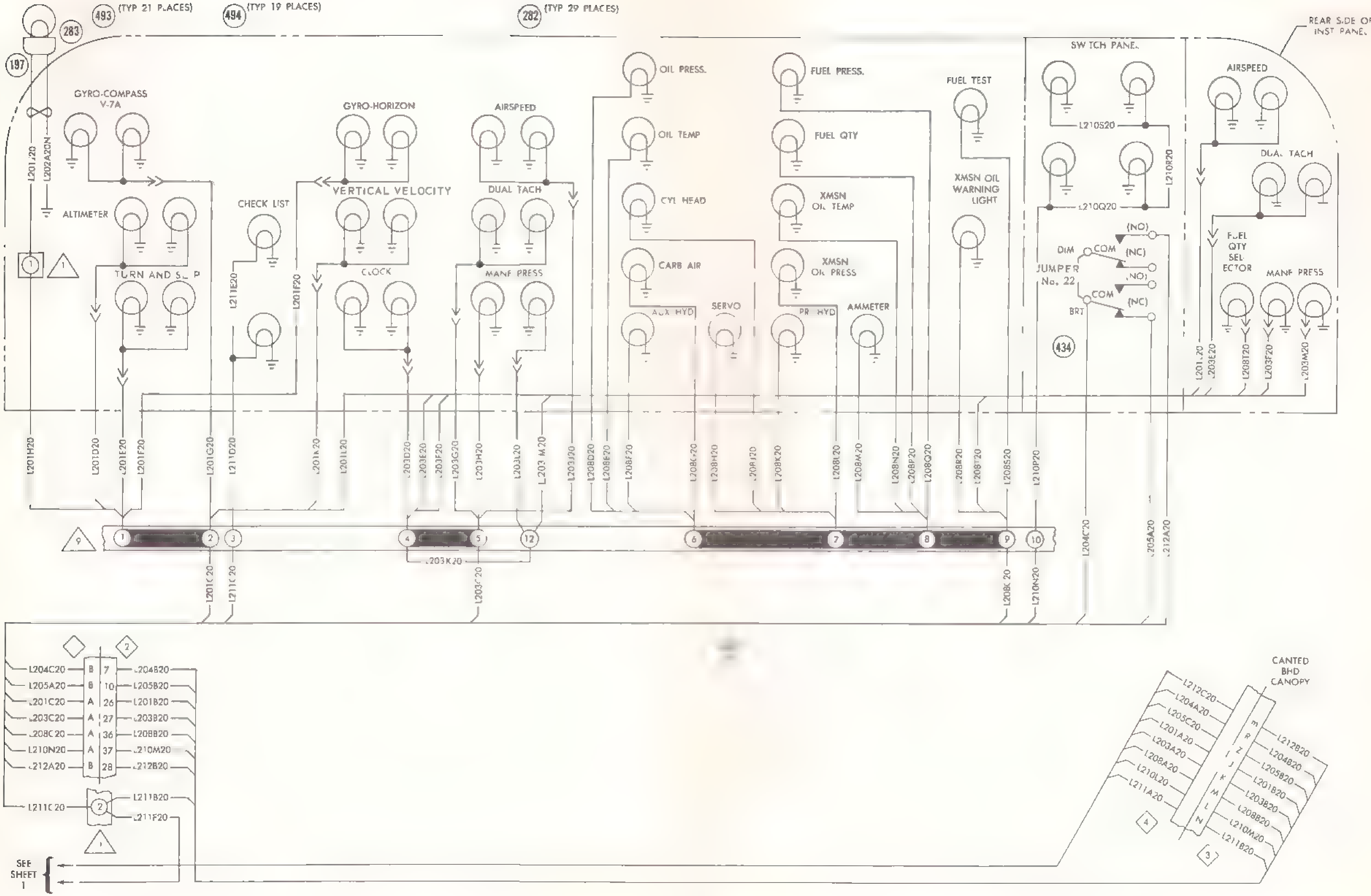
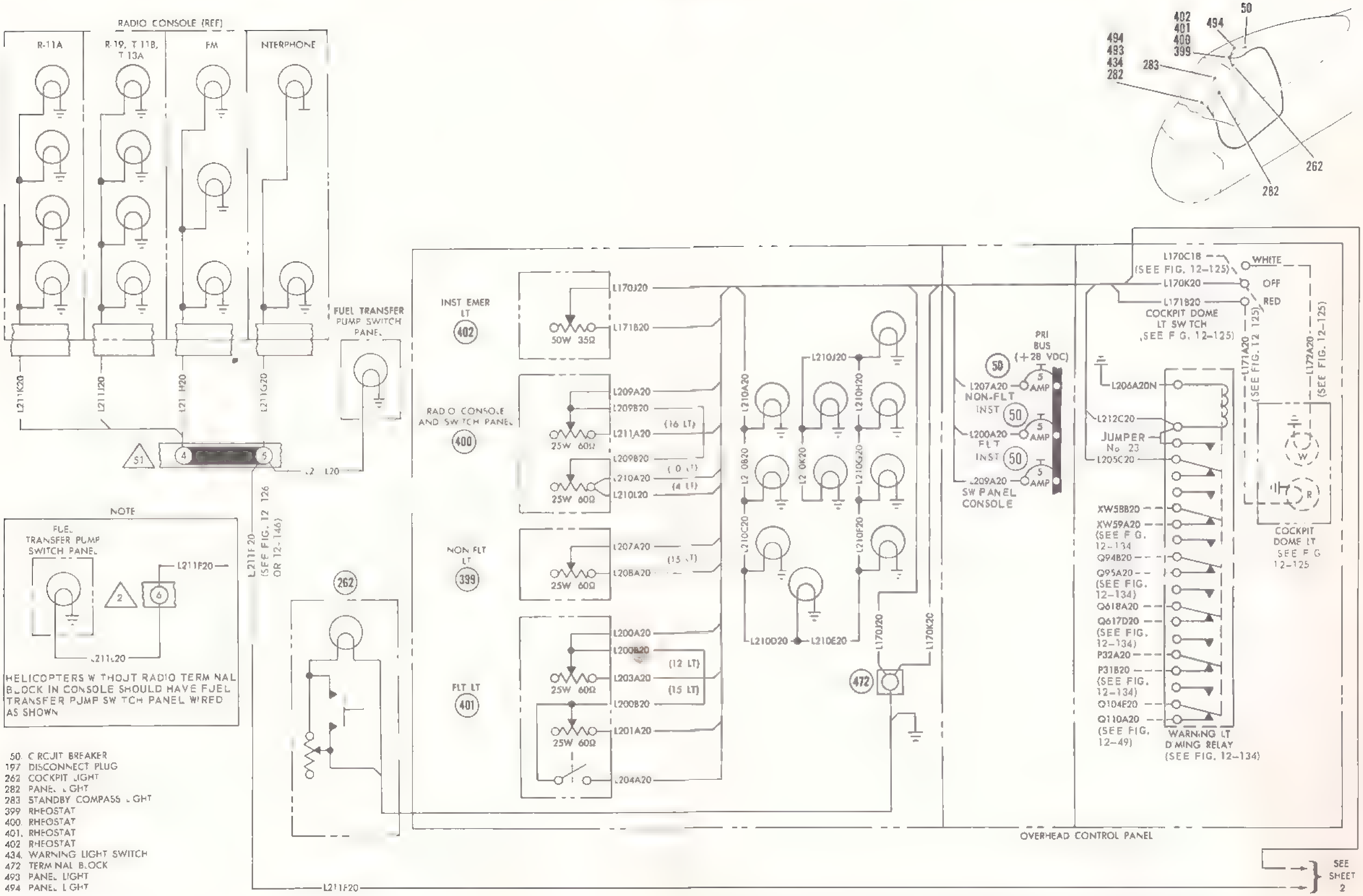


Figure 12–129. Console, panel, and instrument lights (model CH 34A serial No. 54-3000 through 54-3033) (Sheet 2 of 2)



50. CIRCUIT BREAKER
197. DISCONNECT PLUG
262. COCKPIT LIGHT
282. PANEL LIGHT
283. STANDBY COMPASS LIGHT
399. RHEOSTAT
400. RHEOSTAT
401. RHEOSTAT
402. RHEOSTAT
434. WARNING LIGHT SWITCH
472. TERMINAL BLOCK
493. PANEL LIGHT
494. PANEL LIGHT

Figure 12–130. Console, panel, and instrument lights (model CH-34A serial No. 54-3034 through 56-4312) (Sheet 1 of 2)

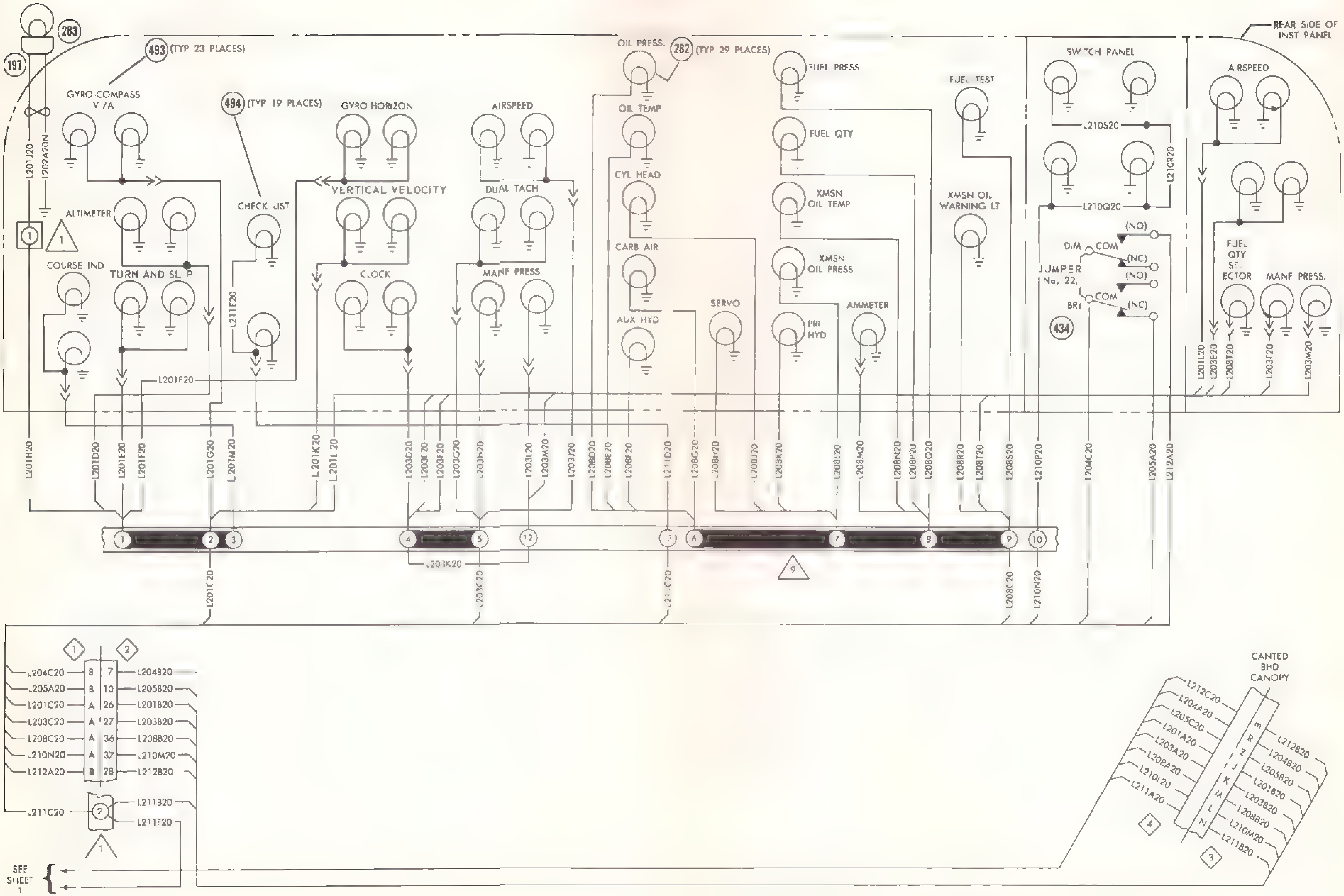
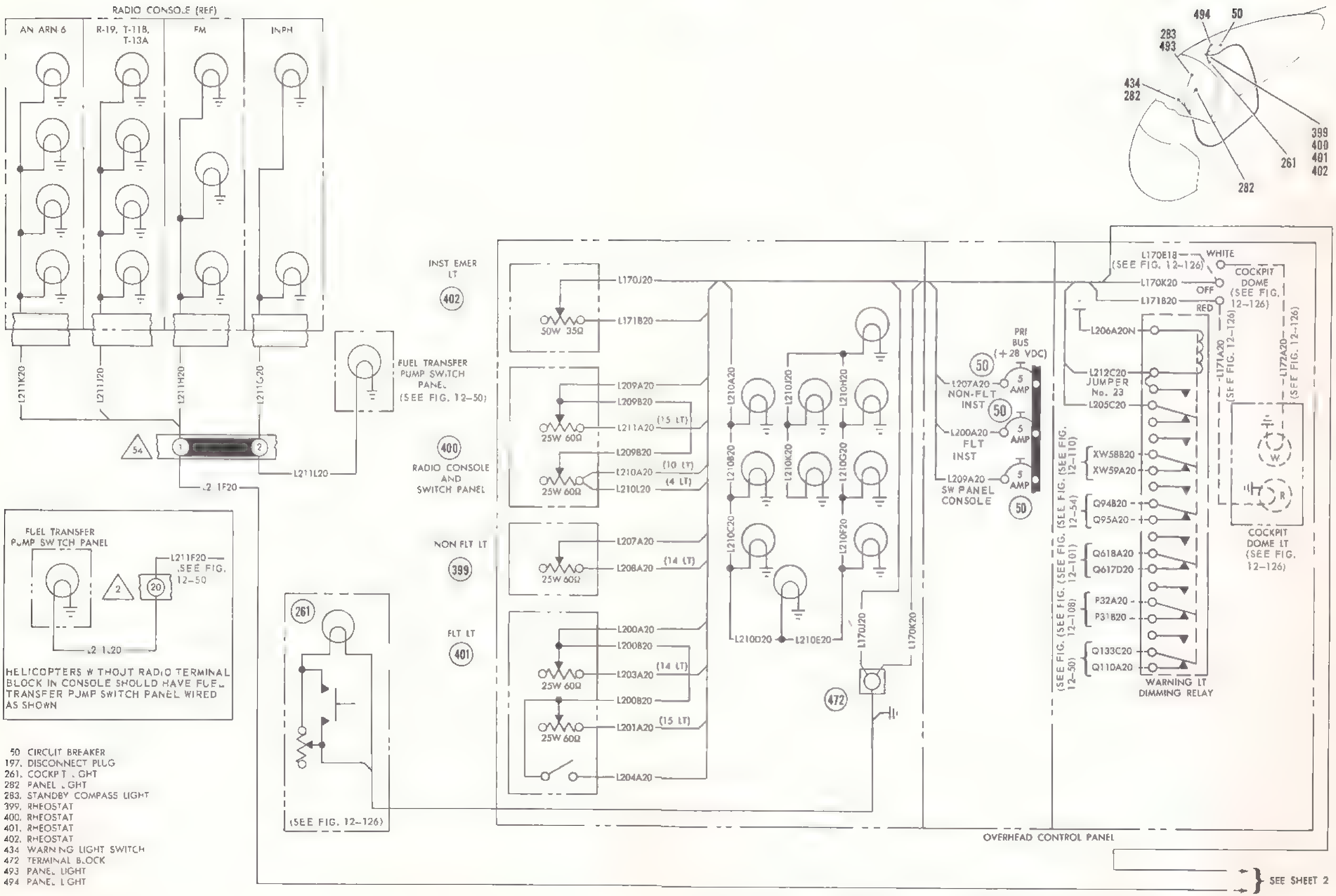


Figure 12—130. Console, panel, and instrument lights {model CH-34A serial No. 54 3034 through 56-4312} {Sheet 2 of 2}



50 CIRCUIT BREAKER
197. DISCONNECT PLUG
261. COCKPIT LIGHT
282 PANEL LIGHT
283. STANDBY COMPASS LIGHT
399. RHEOSTAT
400. RHEOSTAT
401. RHEOSTAT
402. RHEOSTAT
434 WARNING LIGHT SWITCH
472 TERMINAL BLOCK
493 PANEL LIGHT
494 PANEL LIGHT

Figure 12–131. Console, panel, and instrument lights (model CH-34A serial No. 56-4313 through 56-4342) (Sheet 1 of 2)

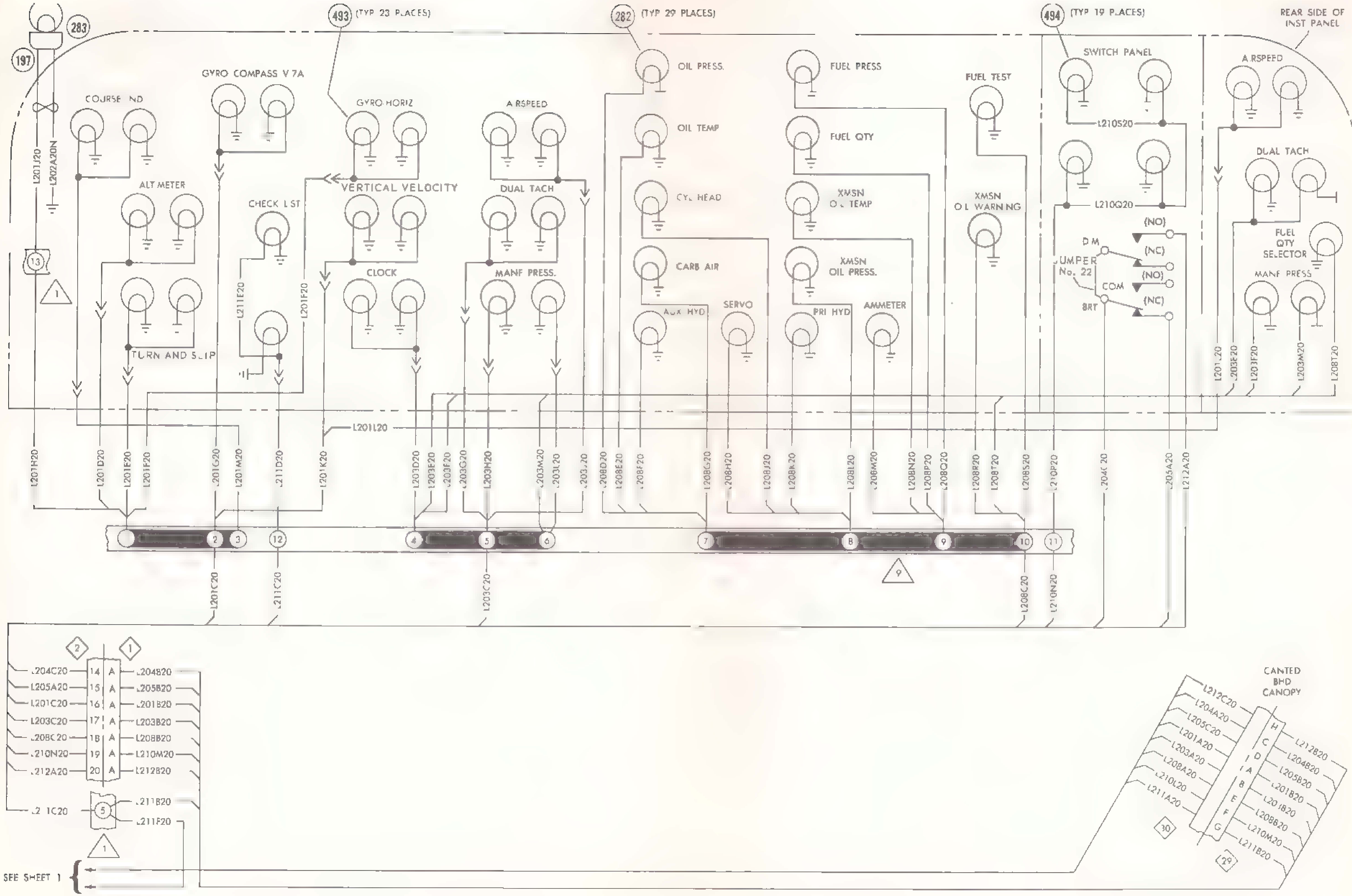
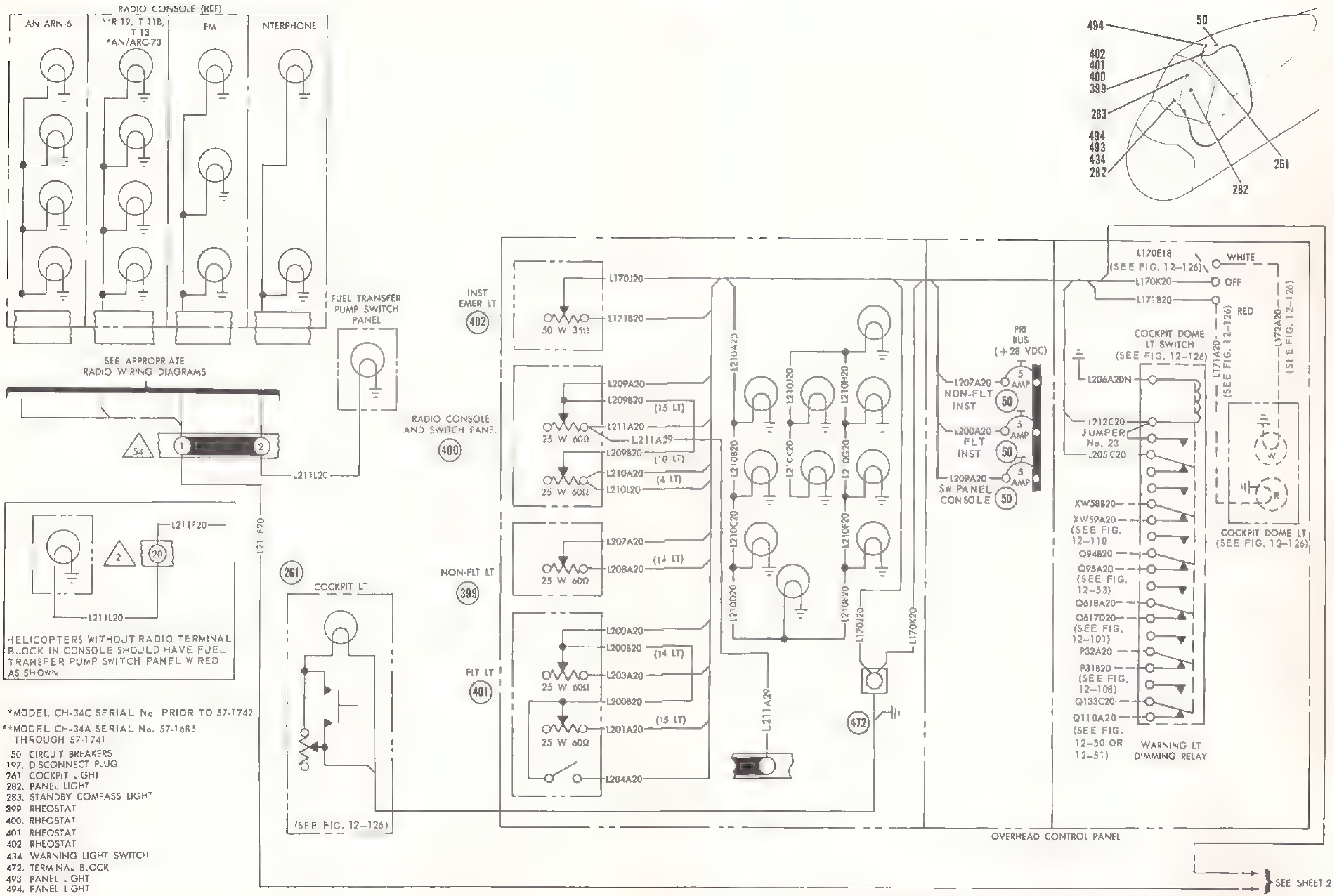


Figure 12–131. Console, panel, and instrument lights (model CH-34A serial No. 56-4313 through 56-4342) (Sheet 2 of 2)



*MODEL CH-34C SERIAL No. PRIOR TO 57-1742
**MODEL CH-34A SERIAL No. 57-1685 THROUGH 57-1741

50 CIRCUIT BREAKERS
197. DISCONNECT PLUG
261 COCKPIT LIGHT
282. PANEL LIGHT
283. STANDBY COMPASS LIGHT
399 RHEOSTAT
400. RHEOSTAT
401 RHEOSTAT
402 RHEOSTAT
434 WARNING LIGHT SWITCH
472. TERMINAL BLOCK
493 PANEL LIGHT
494. PANEL LIGHT

Figure 12-132. Console, panel, and instrument lights (model CH-34A serial No. 57-1684 through 57-1741 and model CH-34C serial No. prior to 57-1741) (Sheet 1 of 2)

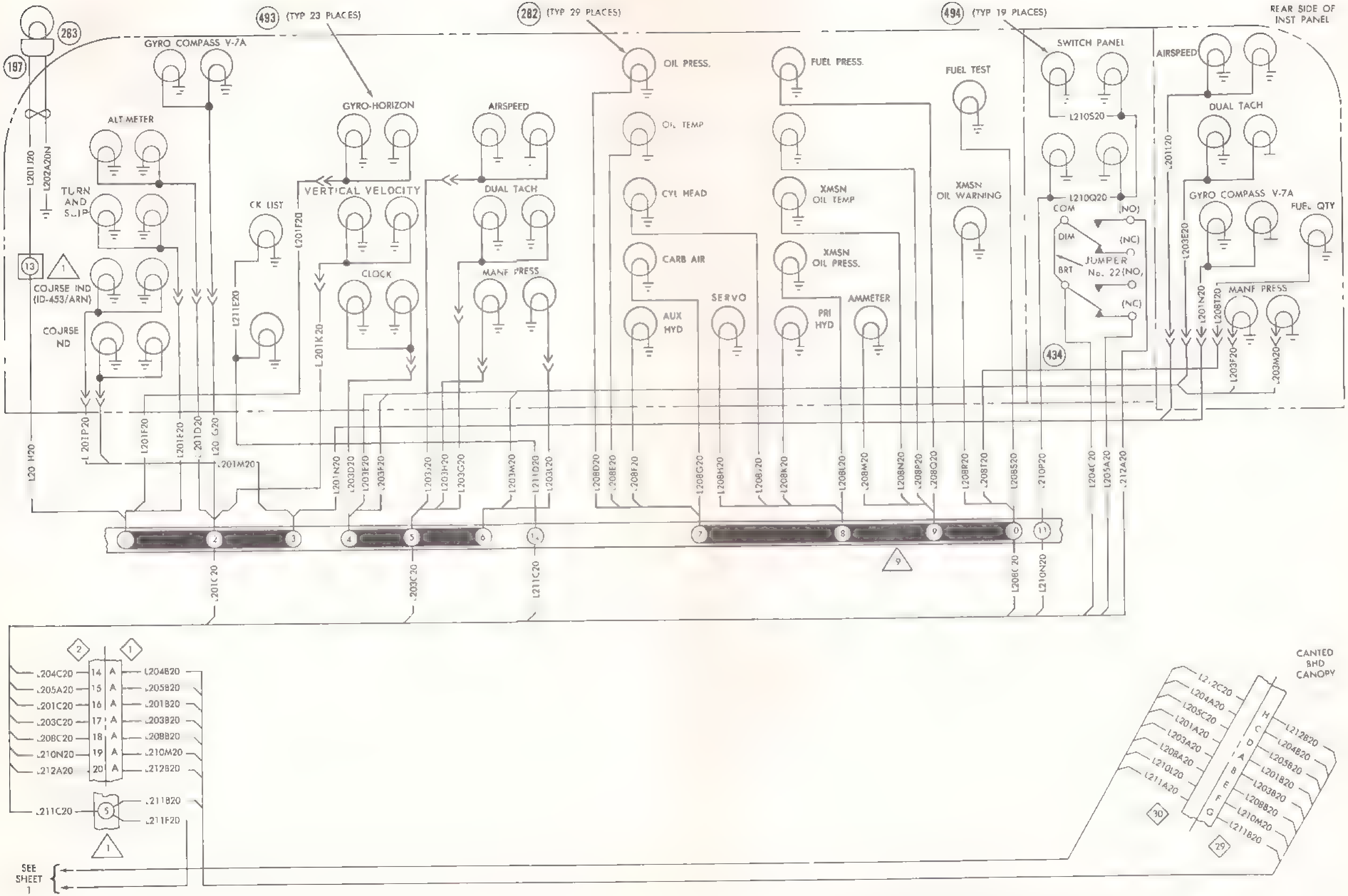
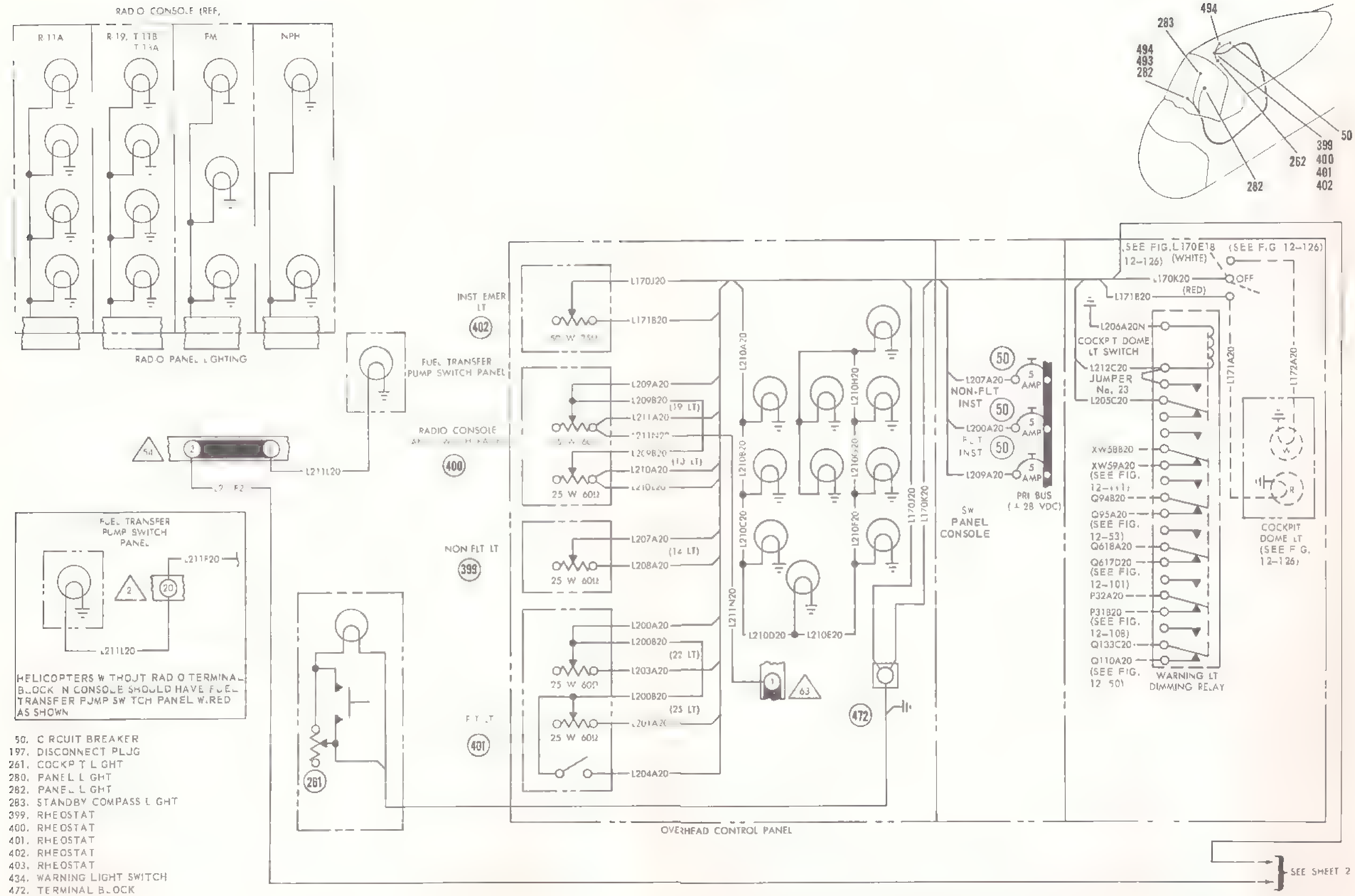


Figure 12—132. Console, panel, and instrument lights (model CH-34A serial No. 57-1684 through 57-1741 and model CH 34C serial No. prior to 57-1741) (Sheet 2 of 2)



50. CIRCUIT BREAKER
197. DISCONNECT PLUG
261. COCKPIT LIGHT
280. PANEL LIGHT
282. PANEL LIGHT
283. STANDBY COMPASS LIGHT
399. RHEOSTAT
400. RHEOSTAT
401. RHEOSTAT
402. RHEOSTAT
403. RHEOSTAT
434. WARNING LIGHT SWITCH
472. TERMINAL BLOCK
494. PANEL LIGHT

Figure 12–133. Console, panel, and instrument lights (model CH-34C serial No. 57-1742 and subsequent) (Sheet 1 of 2)

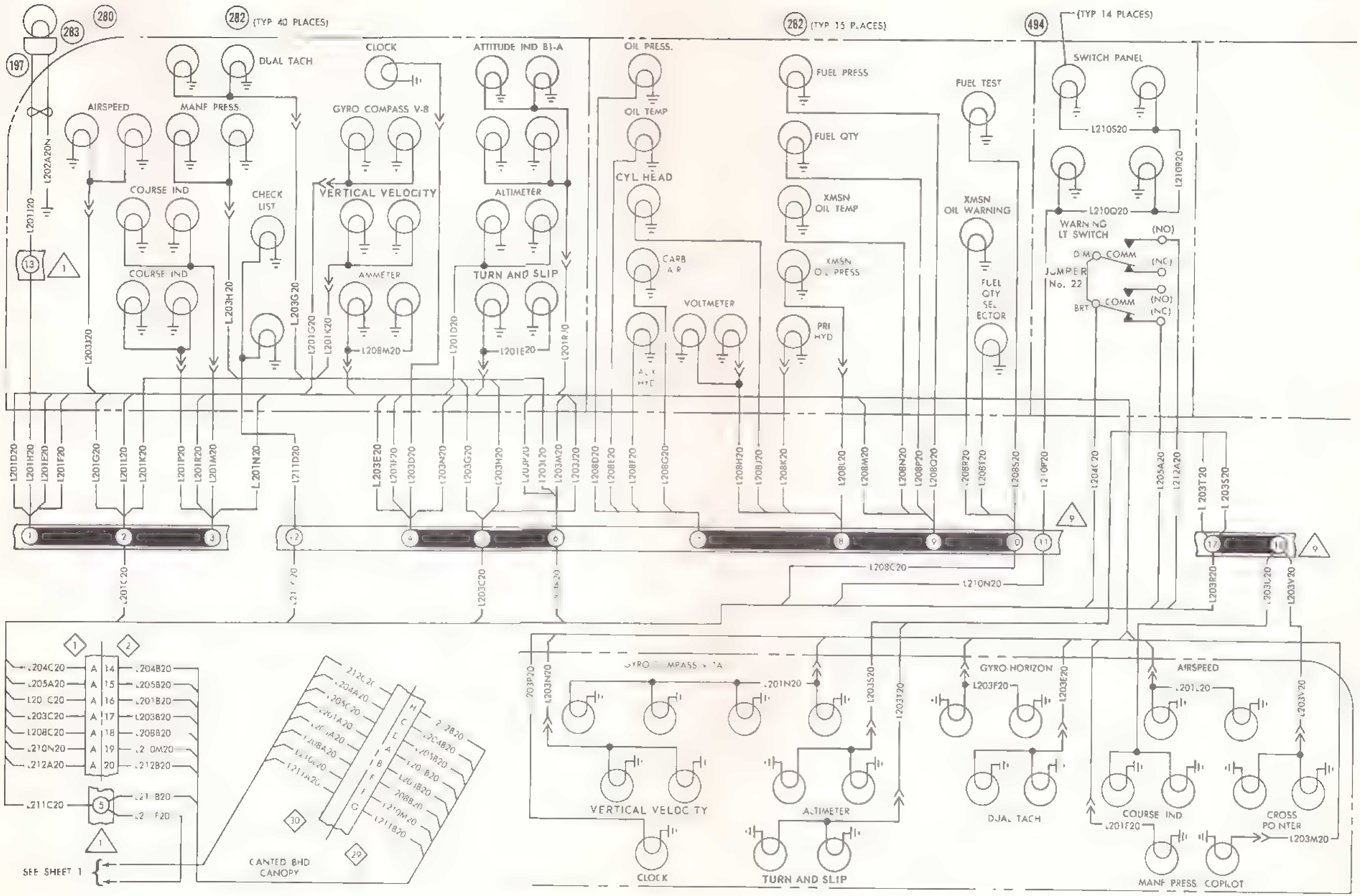


Figure 12–133. Console, panel, and instrument lights {model CH 34C serial No. 57 1742 and subsequent} {Sheet 2 of 2}

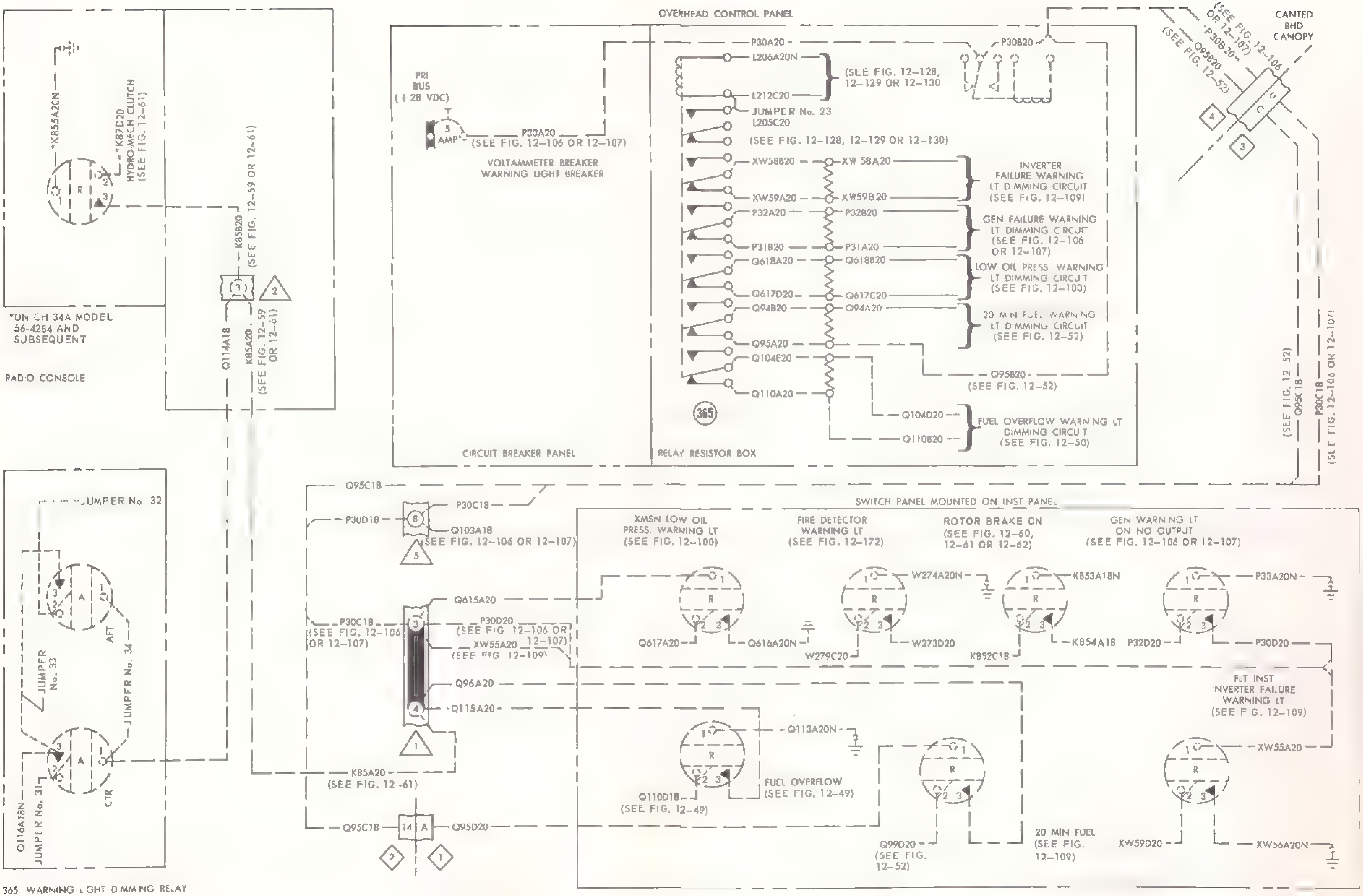
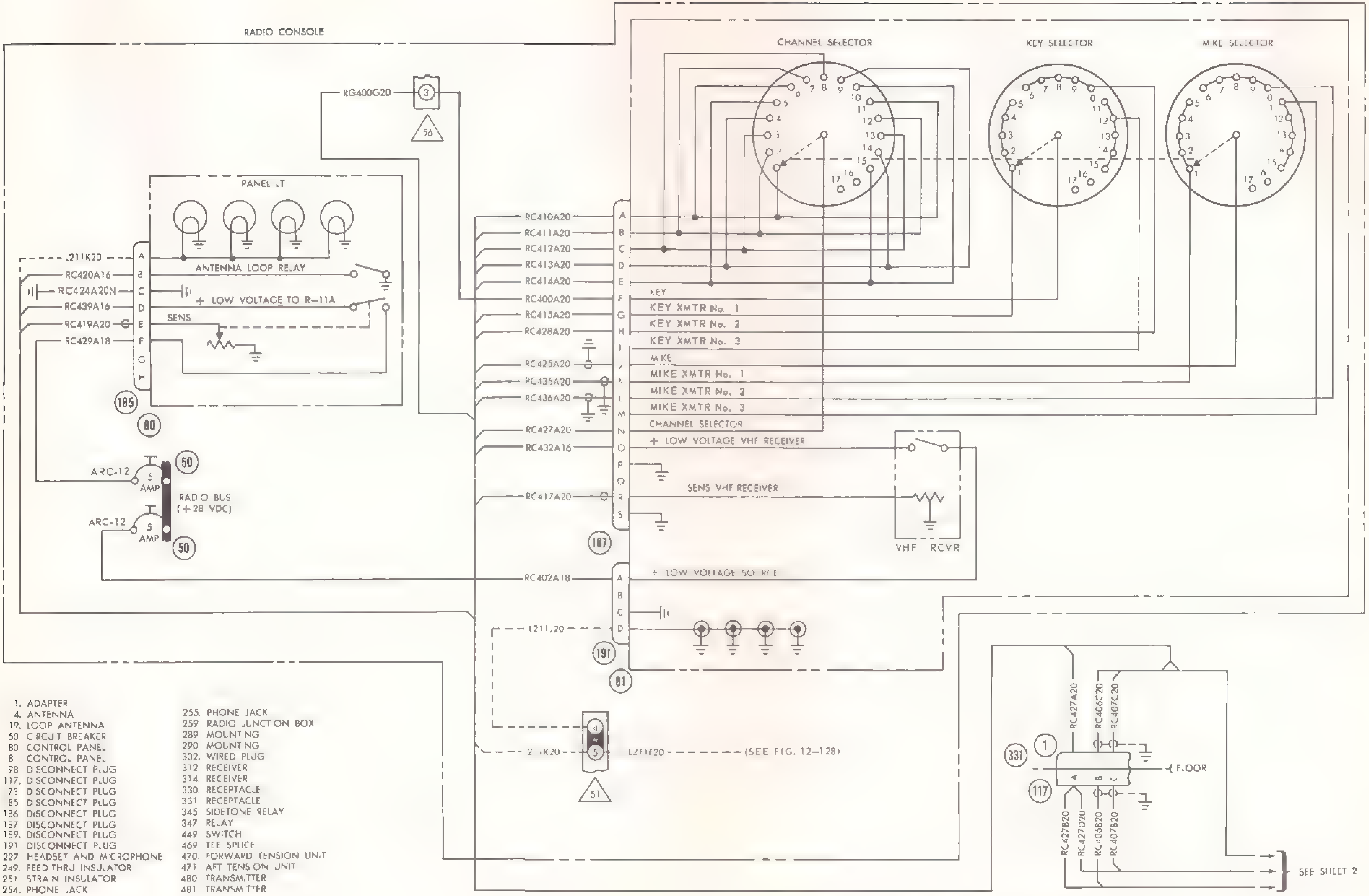


Figure 12–134. Warning light dimming relay (model CH-34A serial No. prior to 56-4313)



1. ADAPTER
4. ANTENNA
19. LOOP ANTENNA
50. CIRCUIT BREAKER
80. CONTROL PANEL
8 CONTROL PANEL
98 DISCONNECT PLUG
117. DISCONNECT PLUG
73 DISCONNECT PLUG
85 DISCONNECT PLUG
186 DISCONNECT PLUG
187 DISCONNECT PLUG
189. DISCONNECT PLUG
191 DISCONNECT PLUG
227 HEADSET AND MICROPHONE
249. FEED THRU INSULATOR
251 STRAIN INSULATOR
254. PHONE JACK
255. PHONE JACK
259 RADIO JUNCTION BOX
289 MOUNTING
290 MOUNTING
302. WIRED PLUG
312 RECEIVER
314 RECEIVER
330 RECEPTACLE
331 RECEPTACLE
345 SIDETONE RELAY
347 RELAY
449 SWITCH
469 TEE SPLICE
470 FORWARD TENSION UNIT
471 AFT TENSION UNIT
480 TRANSMITTER
481 TRANSMITTER

Figure 12–135. Radio set and LF range receiver (ARC type 12) (model CH-34A serial No. prior to 54-882) (Sheet 1 of 3)

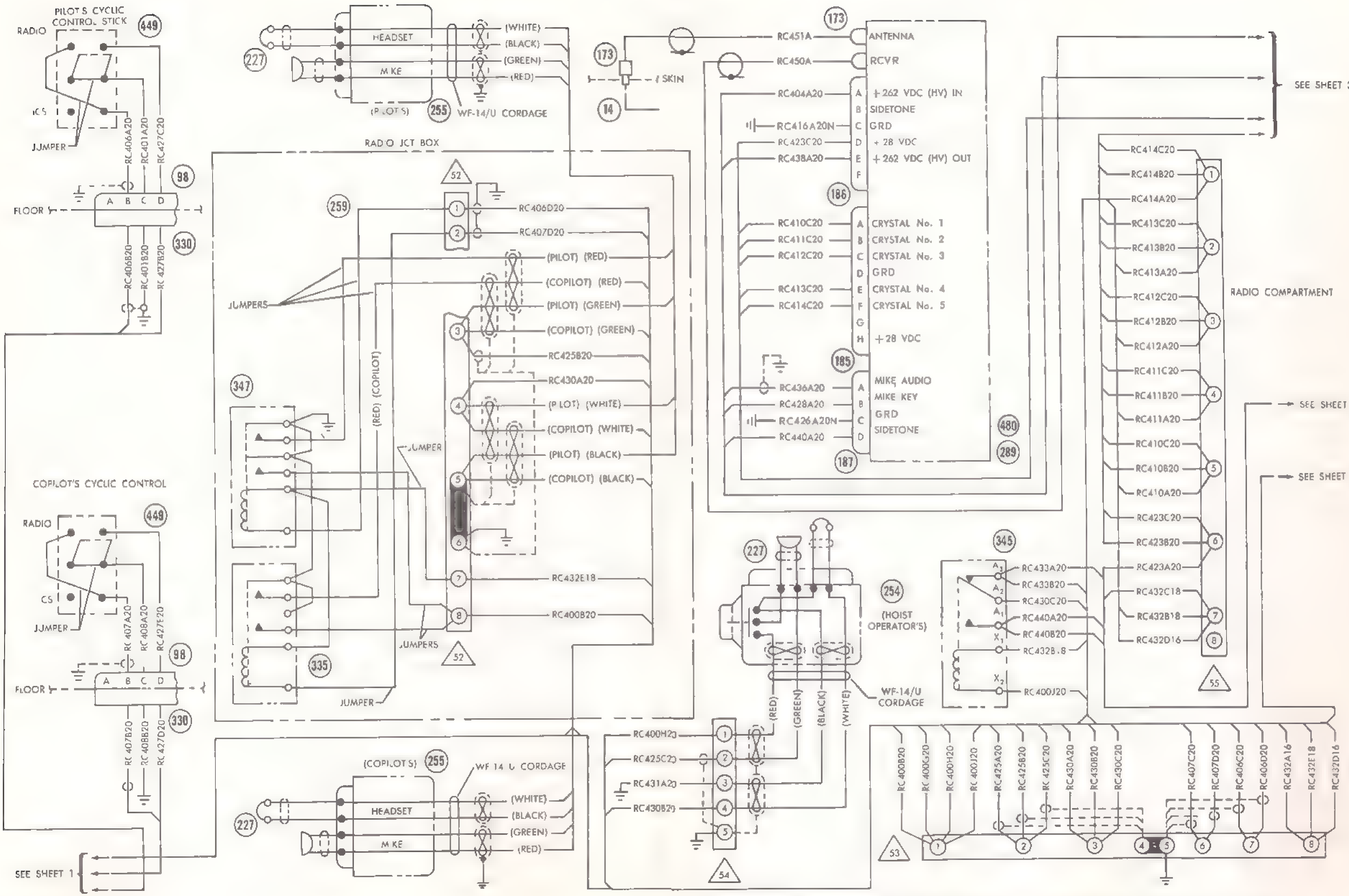


Figure 12–135. Radio set and LF range receiver (ARC type 12) (model CH-34A serial No. prior to 54-882) (Sheet 2 of 3)

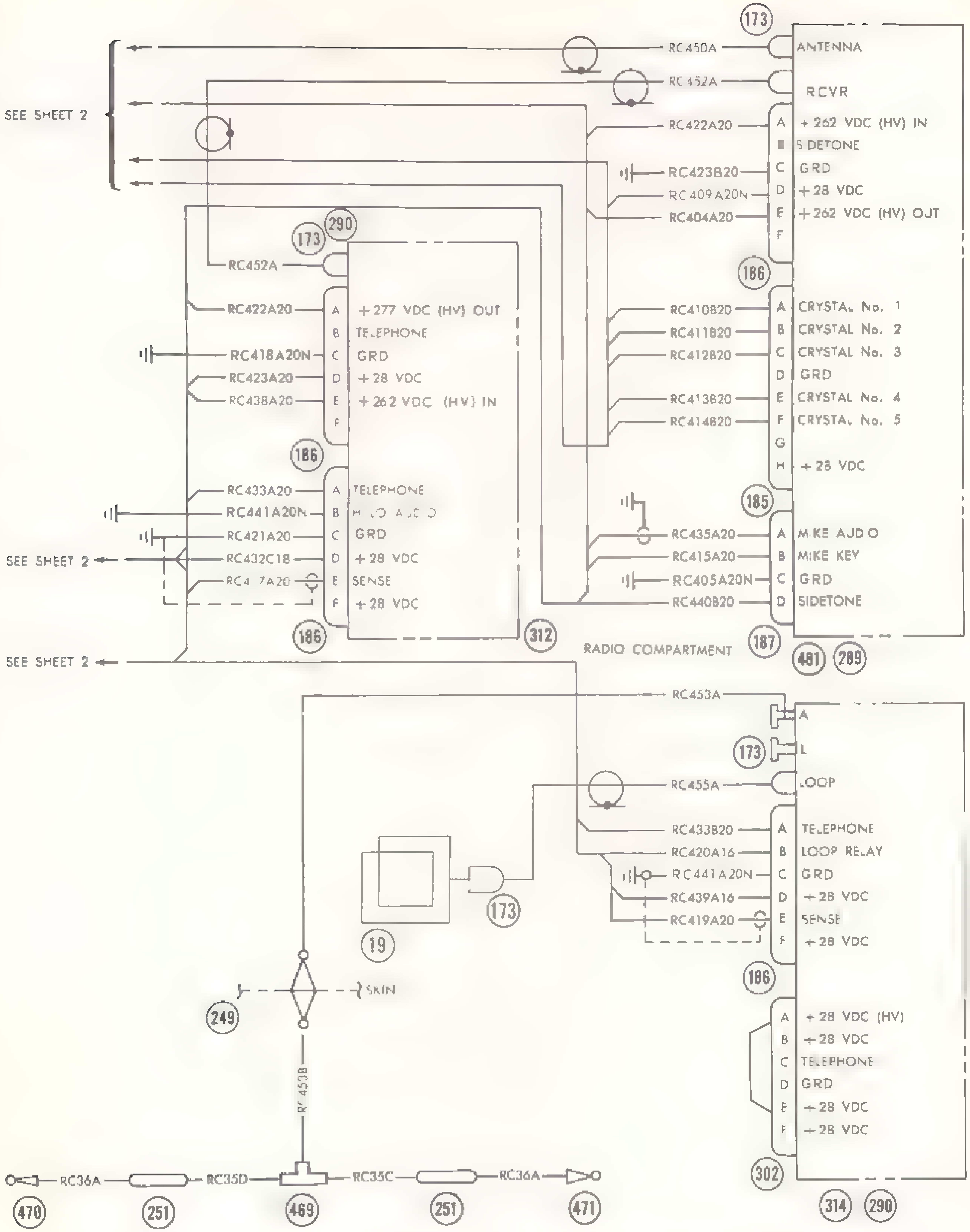
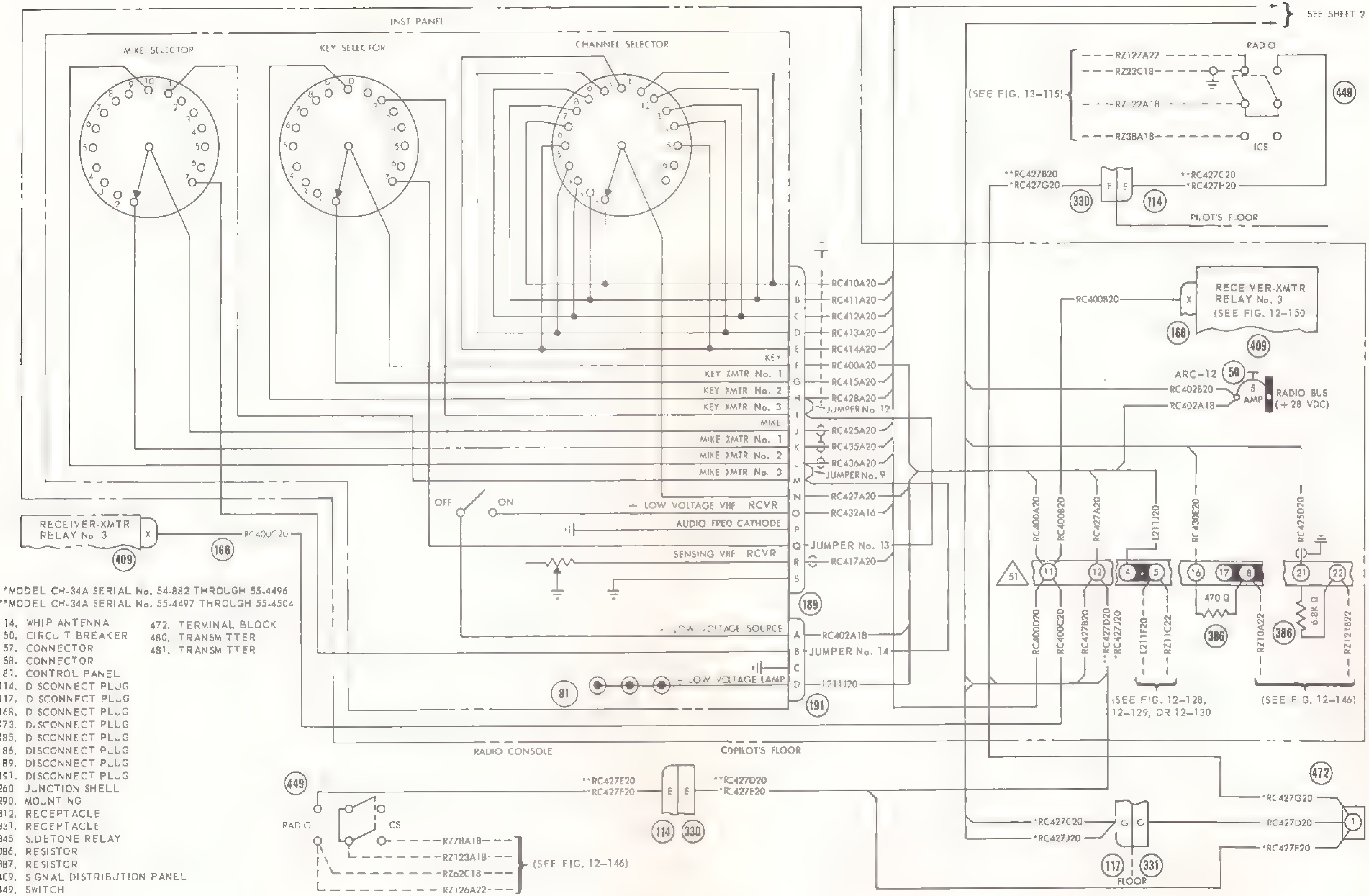


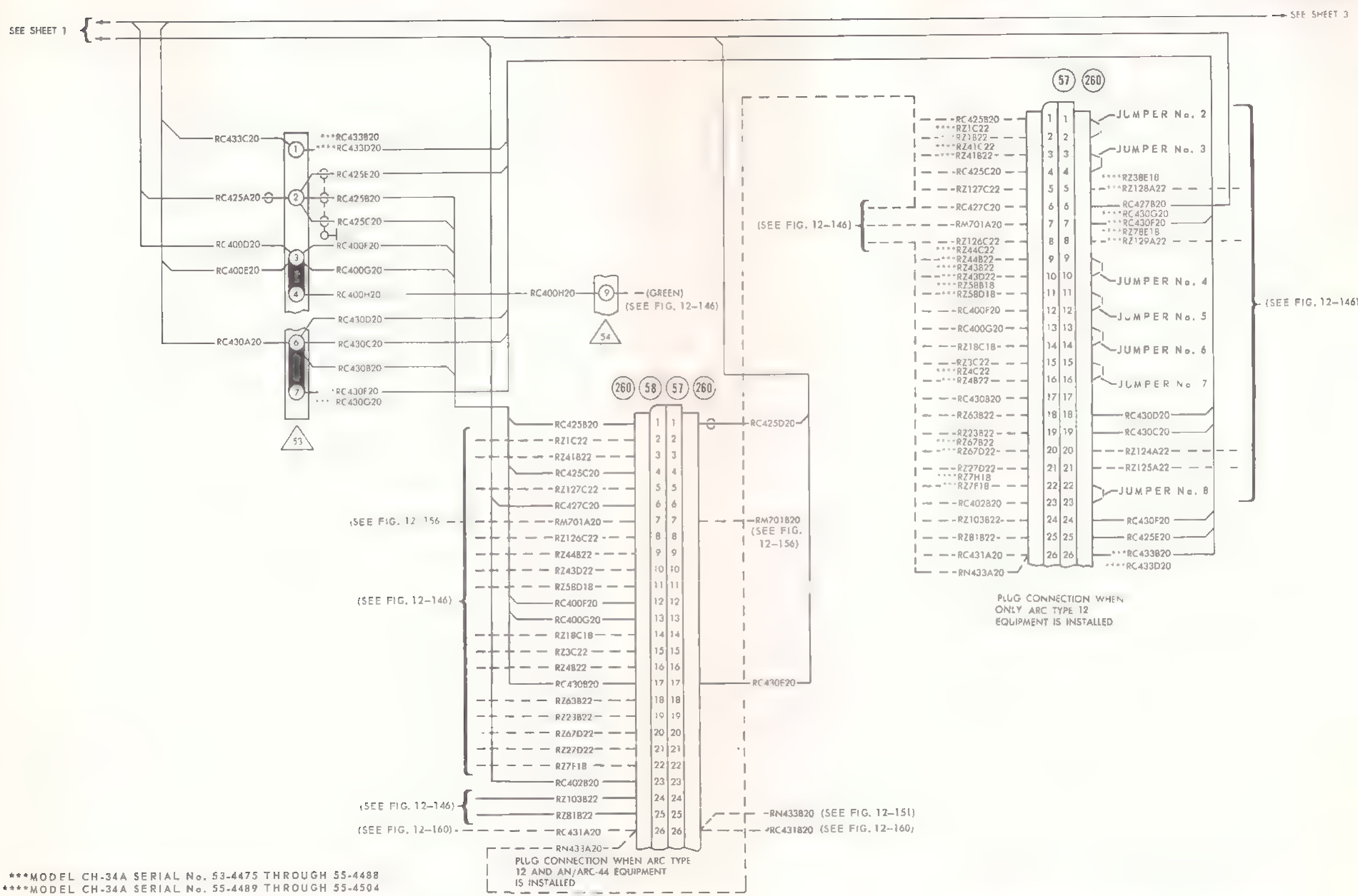
Figure 12-135. Radio set and LF range receiver (ARC type 12) (model CH-34A serial No. prior to 54-882) (Sheet 3 of 3)



*MODEL CH-34A SERIAL No. 54-882 THROUGH 55-4496
**MODEL CH-34A SERIAL No. 55-4497 THROUGH 55-4504

14. WHIP ANTENNA
50. CIRCUIT BREAKER
57. CONNECTOR
58. CONNECTOR
81. CONTROL PANEL
114. DISCONNECT PLUG
117. DISCONNECT PLUG
168. DISCONNECT PLUG
173. DISCONNECT PLUG
185. DISCONNECT PLUG
186. DISCONNECT PLUG
189. DISCONNECT PLUG
191. DISCONNECT PLUG
260. JUNCTION SHELL
290. MOUNTING
312. RECEPTACLE
331. RECEPTACLE
345. SIDETONE RELAY
386. RESISTOR
387. RESISTOR
409. SIGNAL DISTRIBUTION PANEL
449. SWITCH
472. TERMINAL BLOCK
480. TRANSMITTER
481. TRANSMITTER

Figure 12–136. Radio set ARC type 12 (model CH 34A serial No. 54-882 through 55-4504) (Sheet 1 of 3)



***MODEL CH-34A SERIAL No. 53-4475 THROUGH 55-4488
****MODEL CH-34A SERIAL No. 55-4489 THROUGH 55-4504

Figure 12–136. Radio set ARC type 12 (model CH 34A serial No. 54-882 through 55-4504) (Sheet 2 of 3)

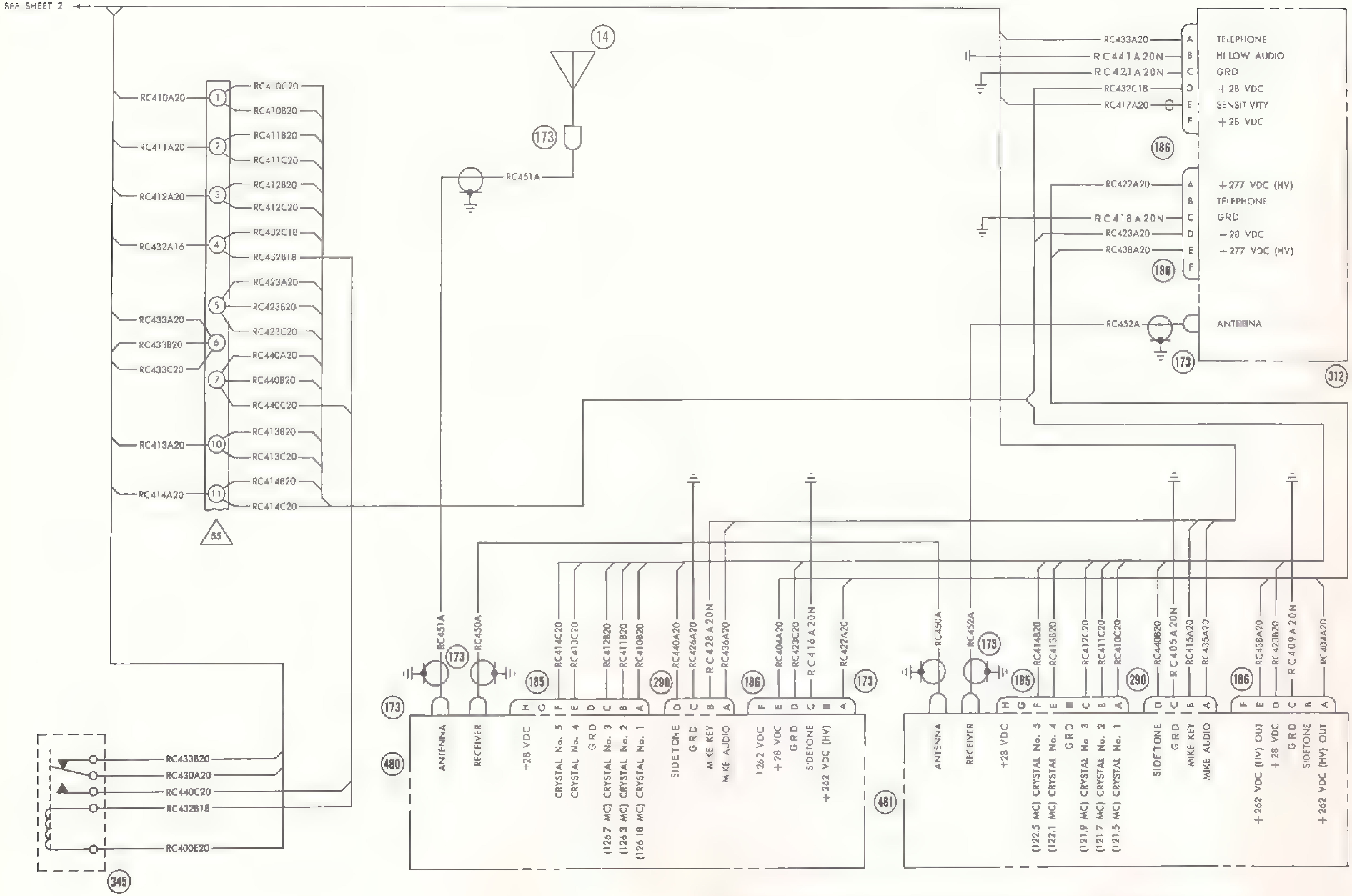
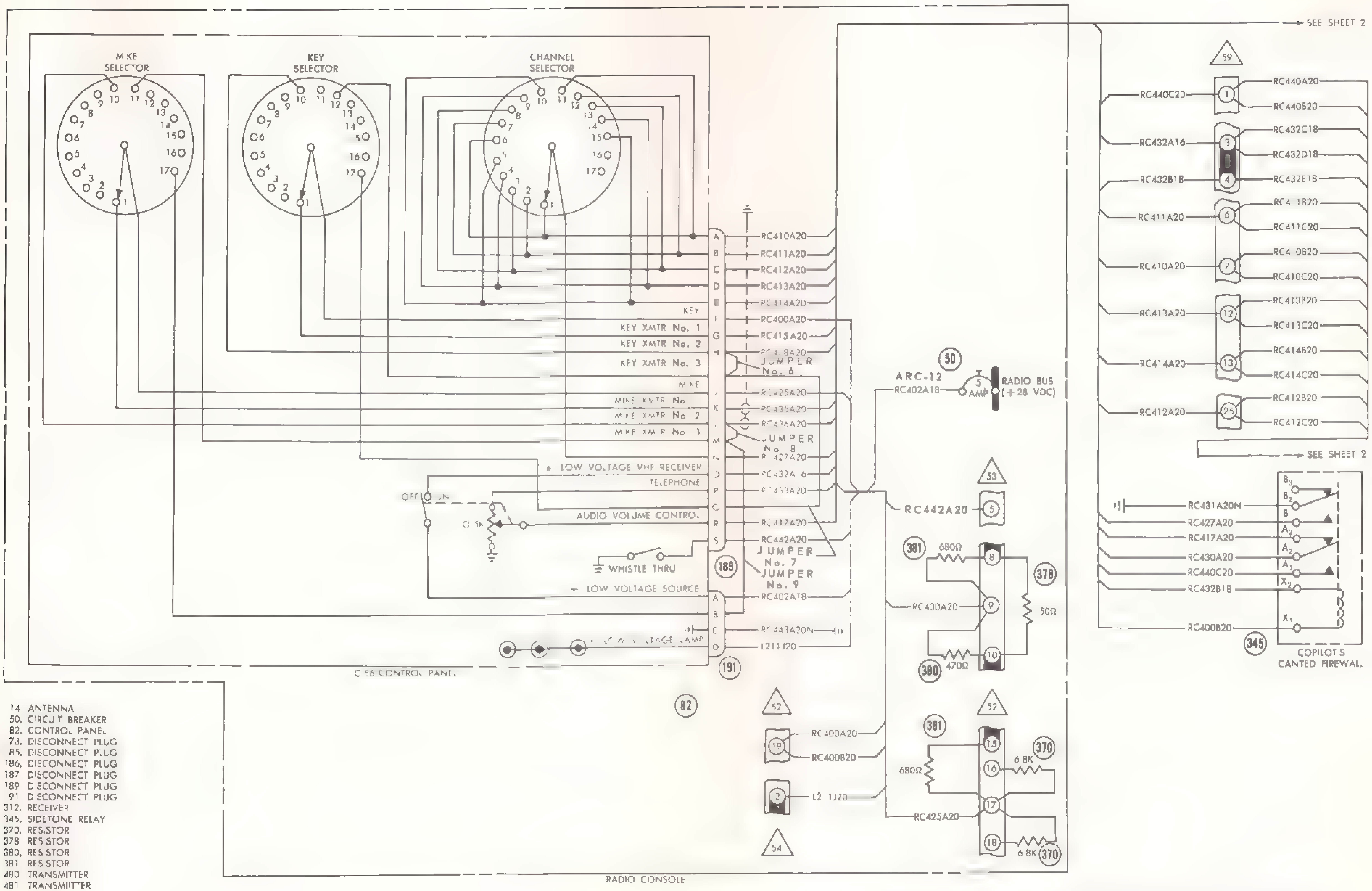
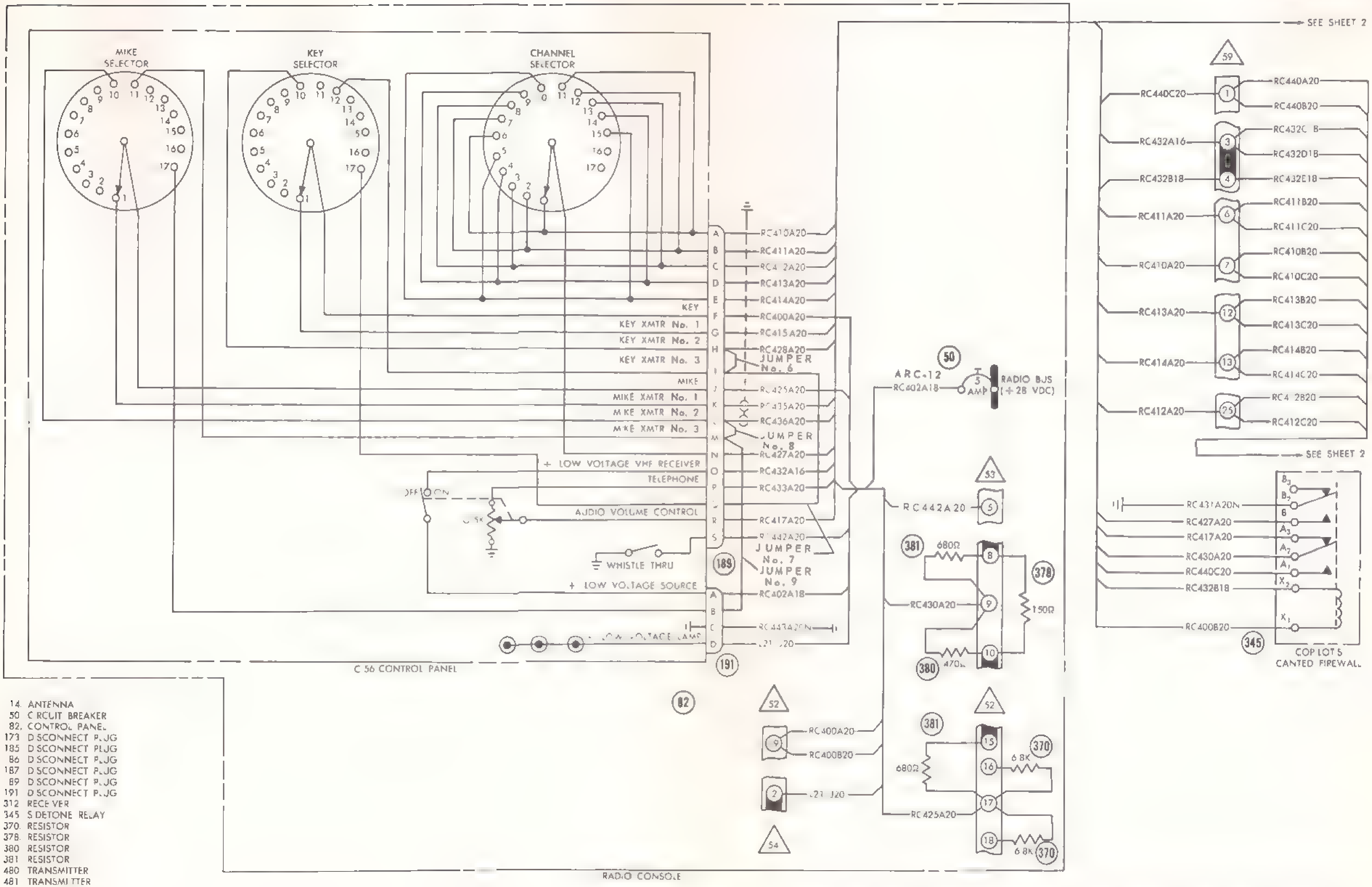


Figure 12–136. Radio set ARC type 12 (model CH 34A serial No. 54-882 through 55-4504) (Sheet 3 of 3)



14 ANTENNA
50. CIRCUIT BREAKER
82. CONTROL PANEL
73. DISCONNECT PLUG
85. DISCONNECT PLUG
186. DISCONNECT PLUG
187 DISCONNECT PLUG
189 DISCONNECT PLUG
191 DISCONNECT PLUG
312. RECEIVER
345. SIDETONE RELAY
370. RESISTOR
378 RESISTOR
380. RESISTOR
381 RESISTOR
480 TRANSMITTER
481 TRANSMITTER

Figure 12—137. Radio set ARC type 12 (model CH-34A serial No. 56-4284 through 56-4314, 56-4317 through 56-4319, and 56-4321 through 56-4342) (Sheet 1 of 2)



14. ANTENNA
50 CIRCUIT BREAKER
82. CONTROL PANEL
173 DISCONNECT PLUG
185 DISCONNECT PLUG
186 DISCONNECT PLUG
187 DISCONNECT PLUG
189 DISCONNECT PLUG
191 DISCONNECT PLUG
312 RECEIVER
345 SIDETONE RELAY
370. RESISTOR
378. RESISTOR
380 RESISTOR
381 RESISTOR
480 TRANSMITTER
481 TRANSMITTER

Figure 12–137. Radio set ARC type 12 (model CH-34A serial No. 56-4284 through 56-4314, 56-4317 through 56-4319, and 56-4321 through 56-4342) (Sheet 1 of 2)

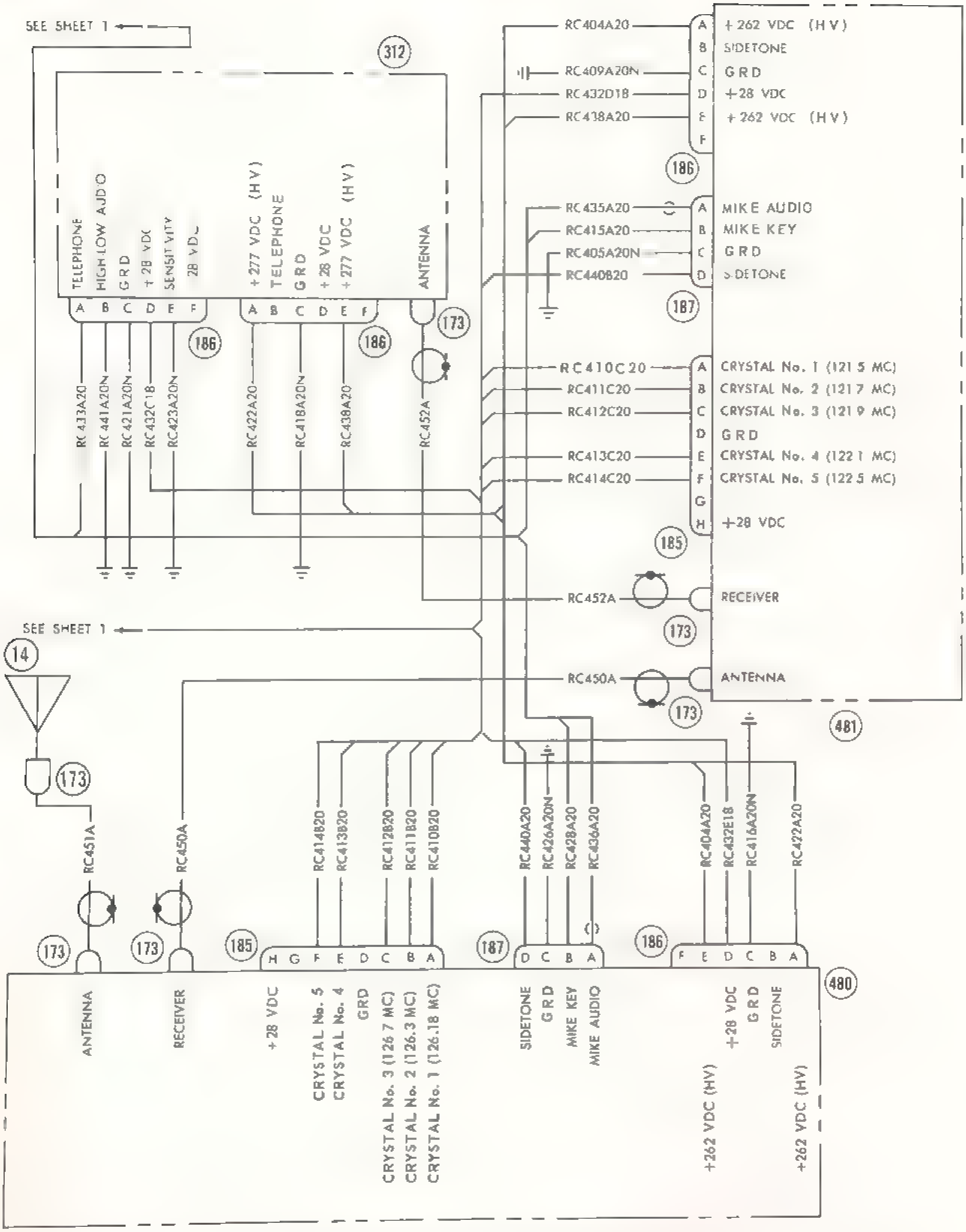
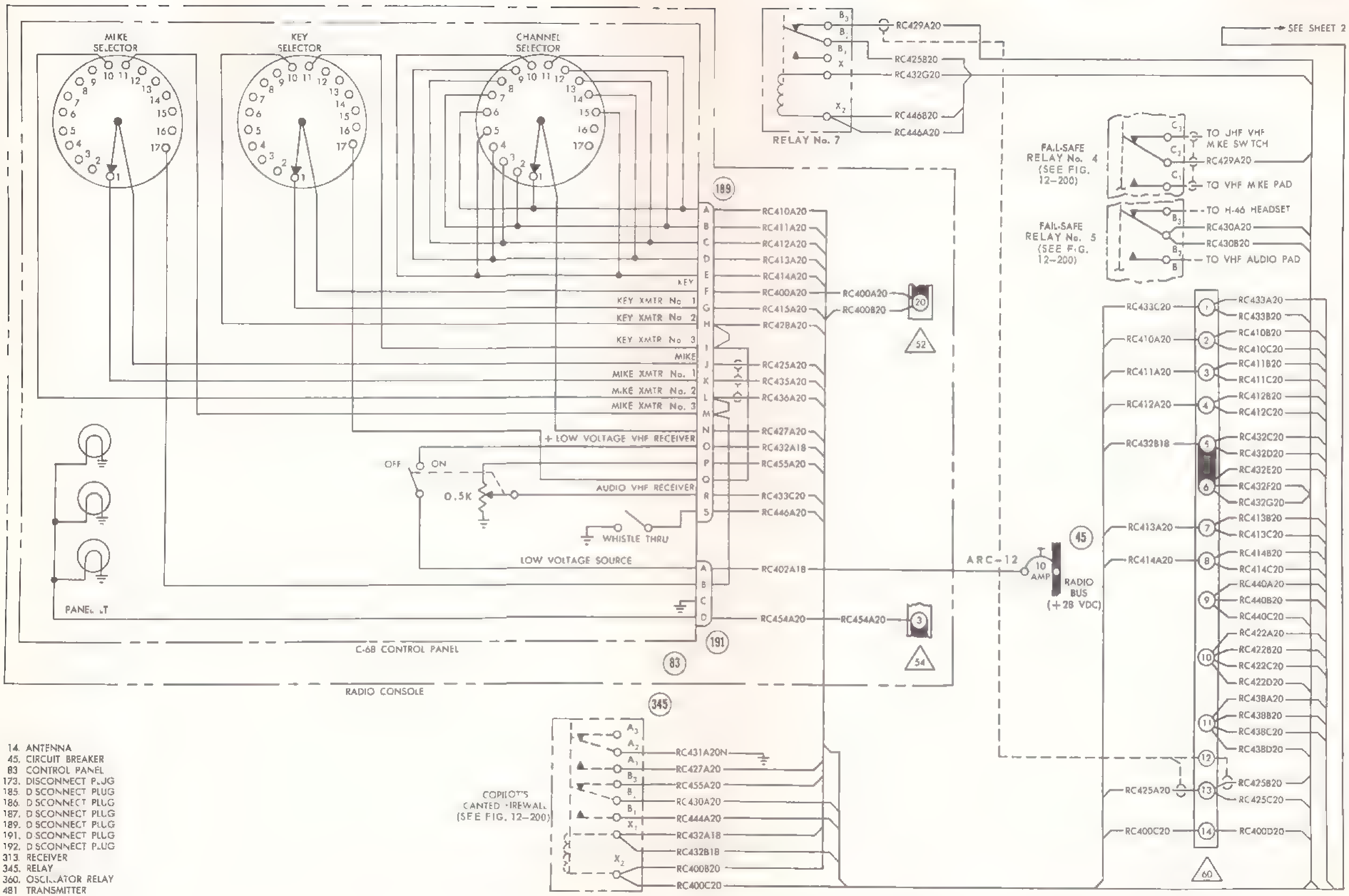


Figure 12–137. Radio set ARC type 12 (model CH 34A serial No. 56-4284 through 56-4314, 56-4317 through 56-4319, and 56-4321 through 56-4342) (Sheet 2 of 2)



14. ANTENNA
45. CIRCUIT BREAKER
83. CONTROL PANEL
173. DISCONNECT PLUG
185. DISCONNECT PLUG
186. DISCONNECT PLUG
187. DISCONNECT PLUG
189. DISCONNECT PLUG
191. DISCONNECT PLUG
192. DISCONNECT PLUG
313. RECEIVER
345. RELAY
360. OSCILLATOR RELAY
481. TRANSMITTER

Figure 12–138. Radio set ARC type 12 (model CH-34A serial No. 57-1691 through 57-1740) (Sheet 1 of 2)

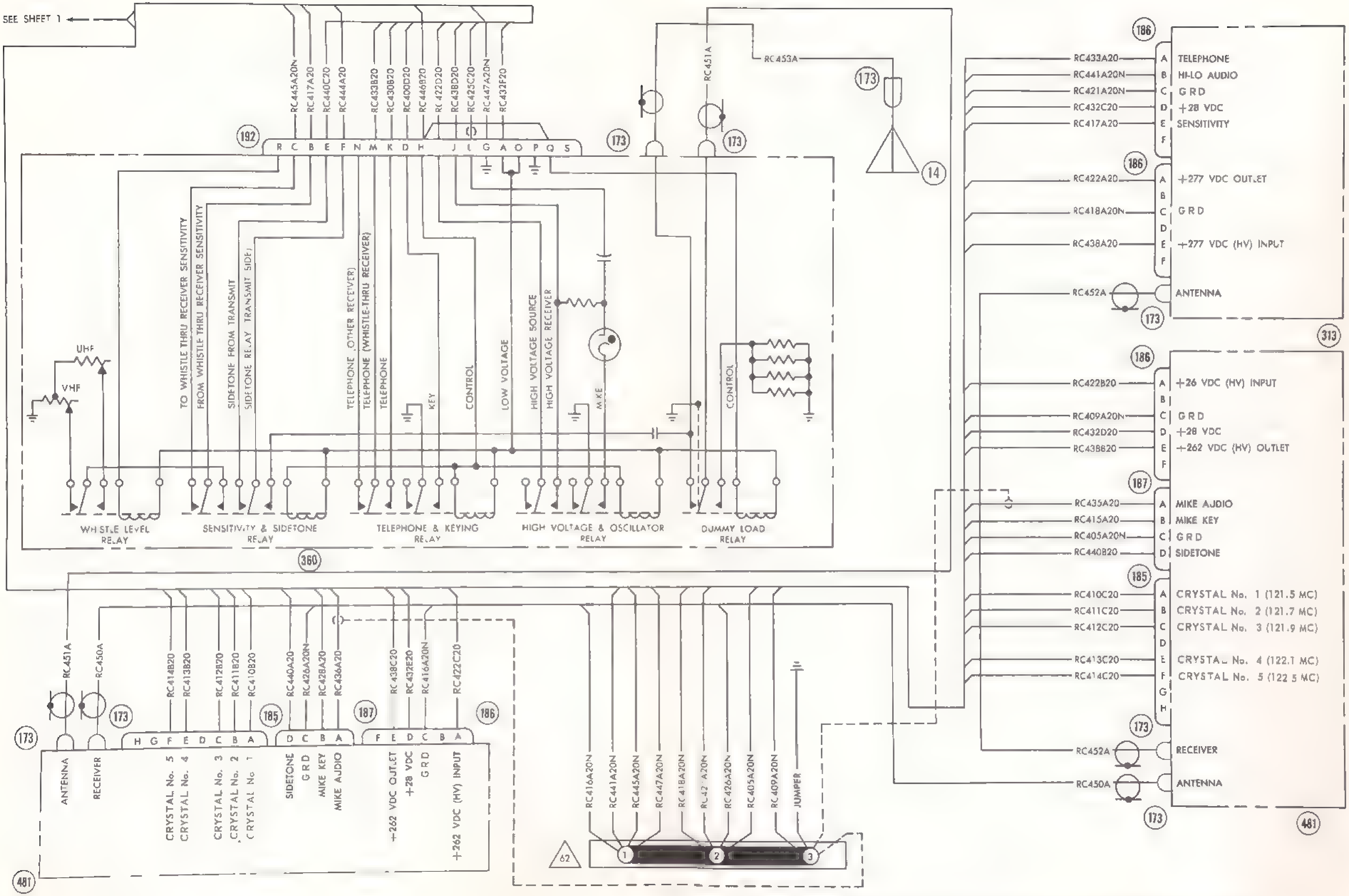
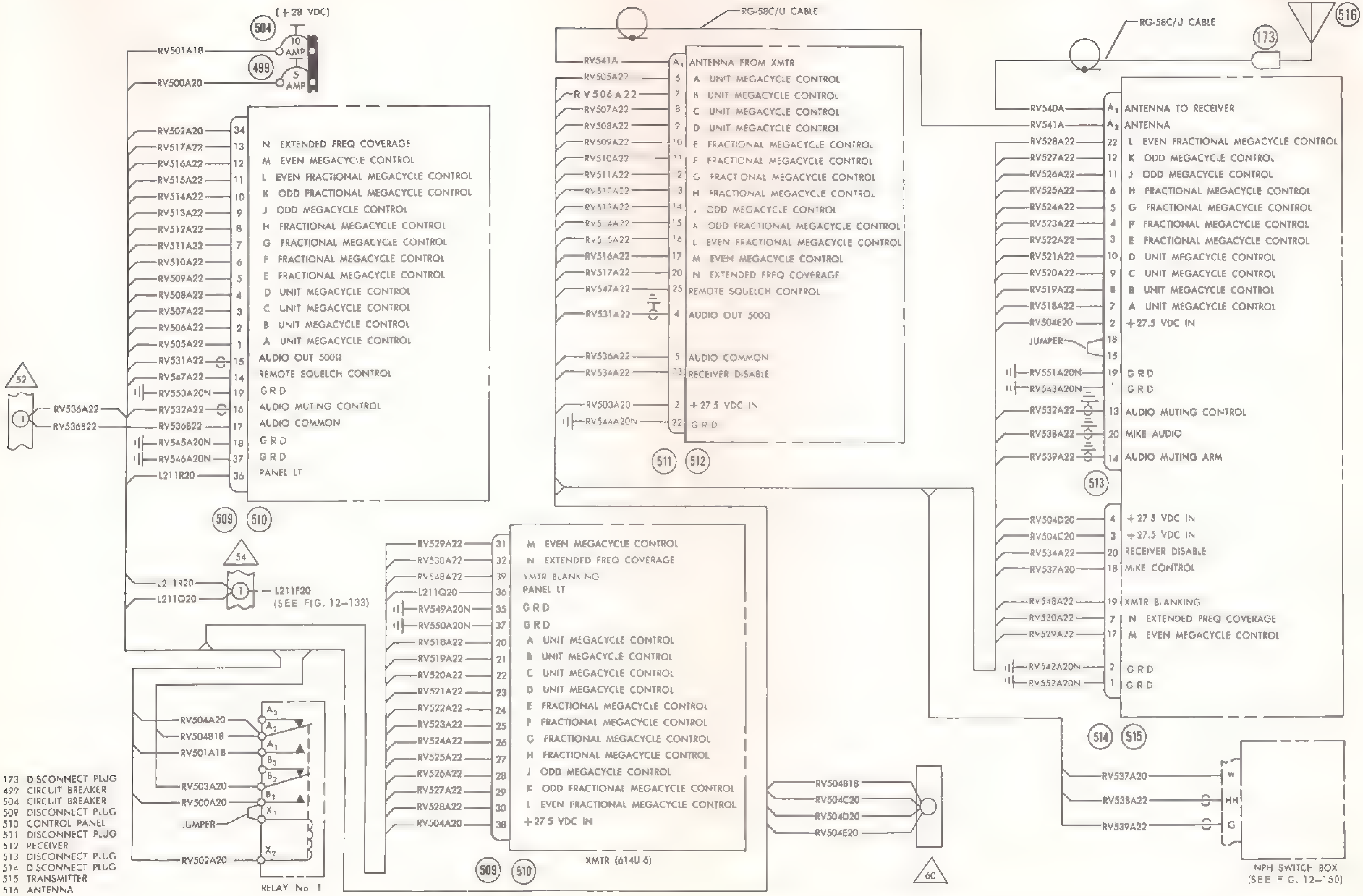
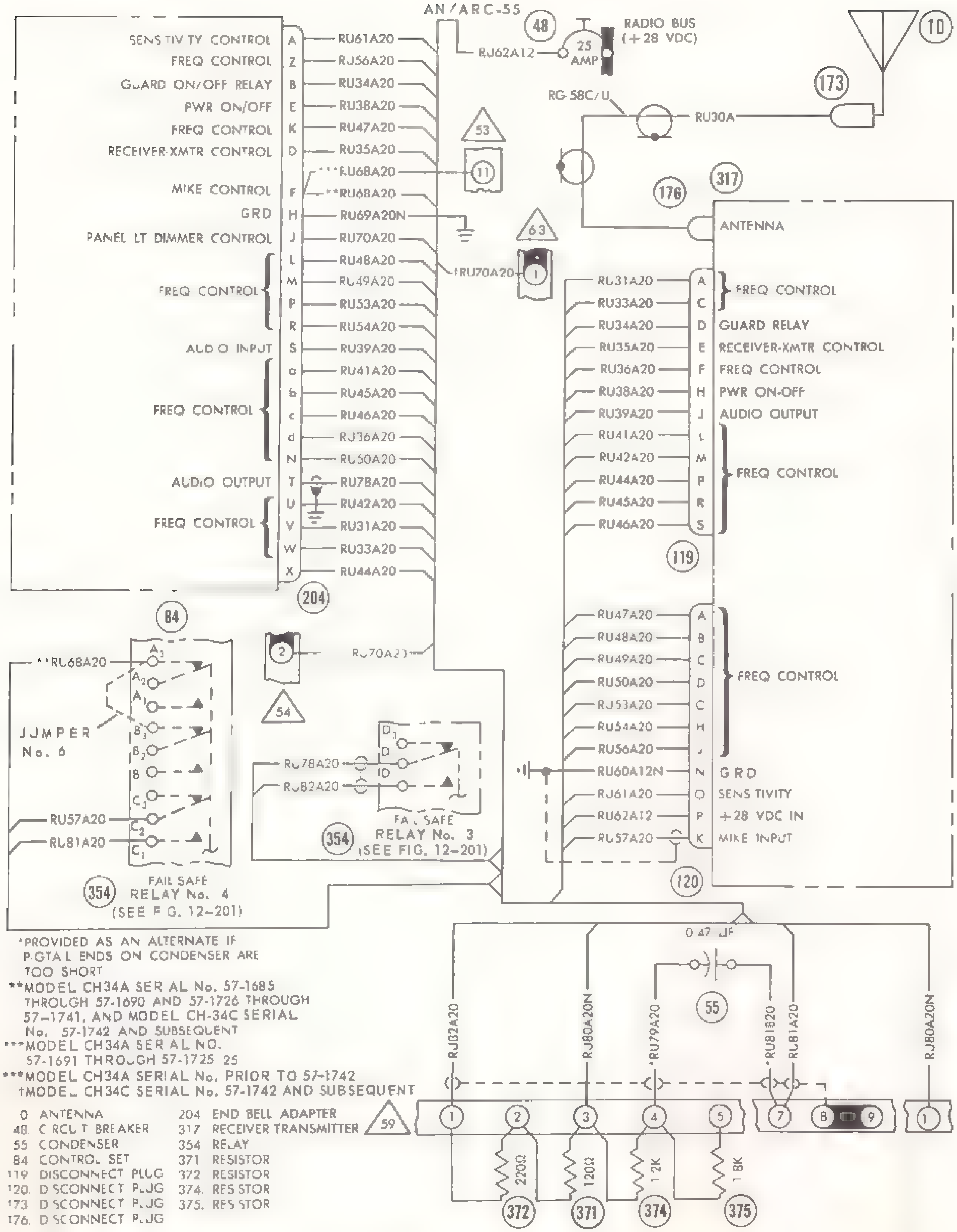


Figure 12–138. Radio set ARC type 12 (model CH-34A serial No. 57-1691 through 57-1740) (Sheet 2 of 2)



173 DISCONNECT PLUG
499 CIRCUIT BREAKER
504 CIRCUIT BREAKER
509 DISCONNECT PLUG
510 CONTROL PANEL
511 DISCONNECT PLUG
512 RECEIVER
513 DISCONNECT PLUG
514 DISCONNECT PLUG
515 TRANSMITTER
516 ANTENNA

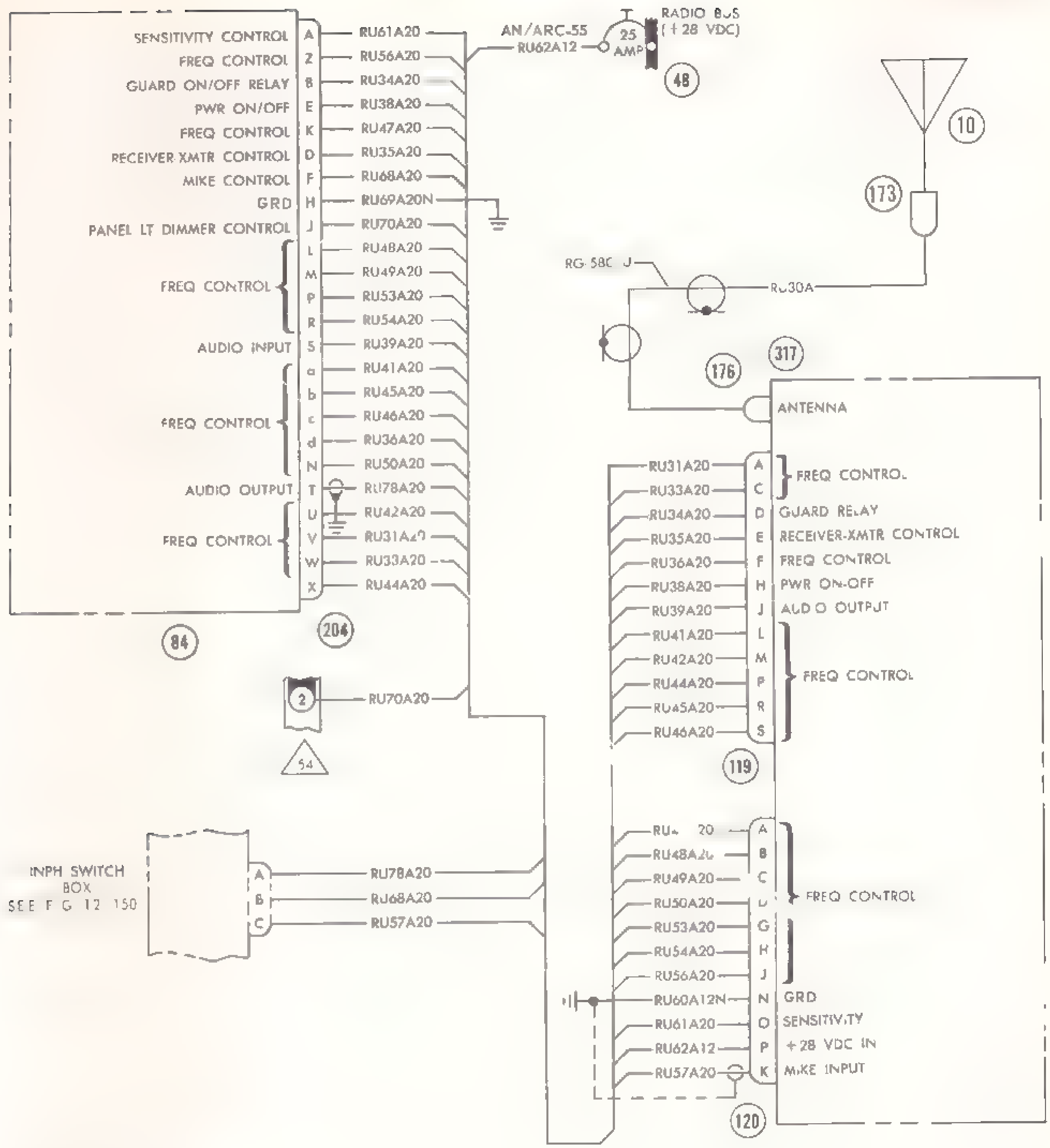
Figure 12–139. Radio set AN/ARC-73 (model CH-34C serial No. prior to 57-1742)



*PROVIDED AS AN ALTERNATE IF PIGTAIL ENDS ON CONDENSER ARE TOO SHORT
**MODEL CH34A SERIAL No. 57-1685 THROUGH 57-1690 AND 57-1726 THROUGH 57-1741, AND MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT
***MODEL CH34A SERIAL NO. 57-1691 THROUGH 57-1725 25
****MODEL CH34A SERIAL No. PRIOR TO 57-1742
†MODEL CH34C SERIAL No. 57-1742 AND SUBSEQUENT

10	ANTENNA	204	END BELL ADAPTER
48	CIRCUIT BREAKER	317	RECEIVER TRANSMITTER
55	CONDENSER	354	RELAY
84	CONTROL SET	371	RESISTOR
119	DISCONNECT PLUG	372	RESISTOR
120	DISCONNECT PLUG	374	RESISTOR
173	DISCONNECT PLUG	375	RESISTOR
176	DISCONNECT PLUG		

Figure 12–140. Radio set AN/ARC-55 (model CH-34A serial No. 57-1685 through 57-1725, 57-1741, and model CH-34C serial No. 57-1742 and subsequent)



10 ANTENNA
48 CIRCUIT BREAKER
84 CONTROL SET
119 DISCONNECT PLUG
120 DISCONNECT PLUG
173 DISCONNECT PLUG
176 DISCONNECT PLUG
204 END BELL ADAPTER
317 RECEIVER TRANSMITTER

Figure 12—141. Radio set AN/ARC-55 (model CH 34C serial No. prior to 57-1742)

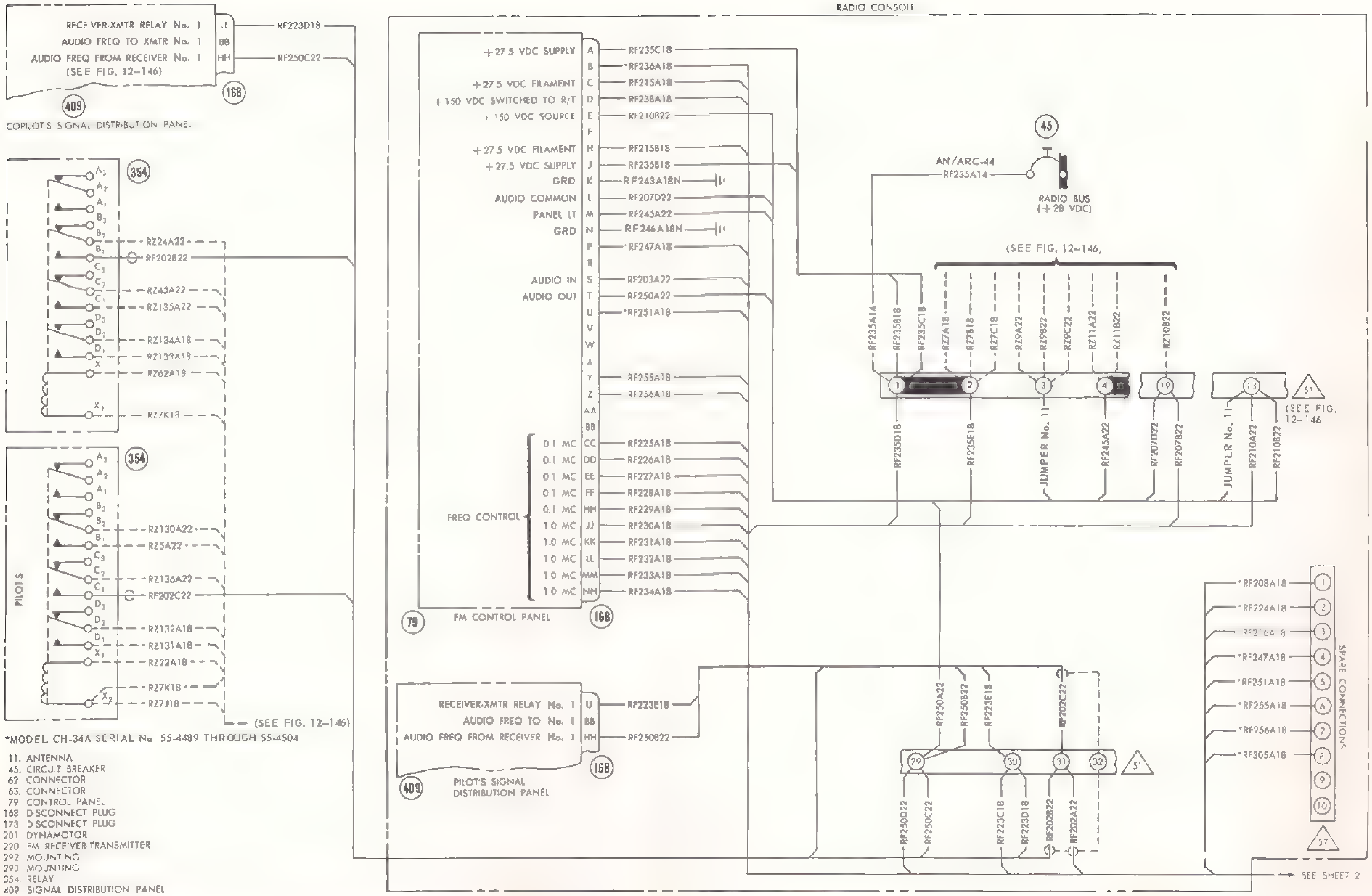
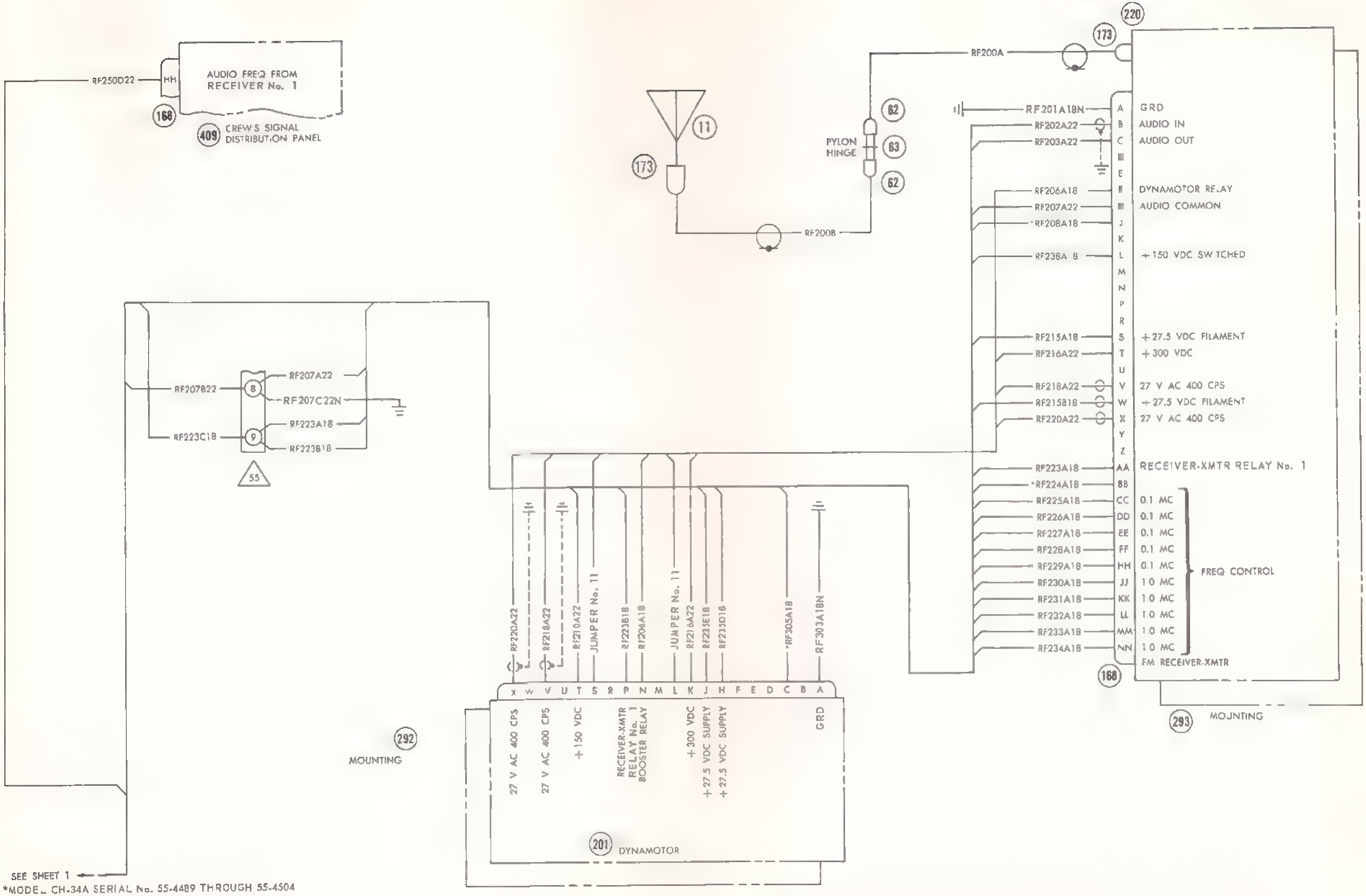
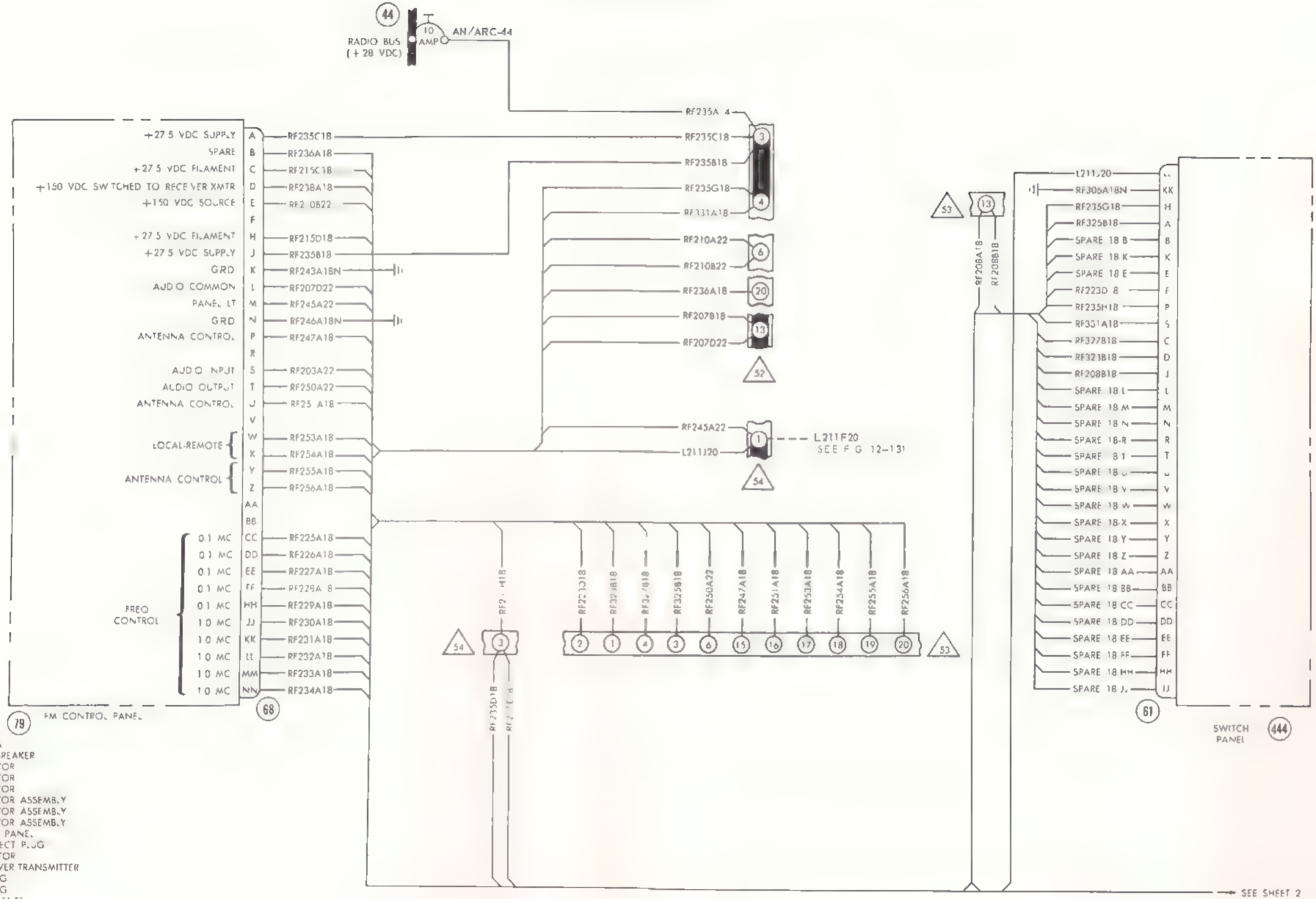


Figure 12–142. Radio set AN/ARC-44 (model CH-34A serial No. 54-882 through 55-4504) (Sheet 1 of 2)



*MODEL CH-34A SERIAL No. 55-4489 THROUGH 55-4504

Figure 12–142. Radio set AN/ARC-44 (model CH-34A serial No. 54-882 through 55-4504) (Sheet 2 of 2)



1 ANTENNA
44 CIRCUIT BREAKER
6 CONNECTOR
62 CONNECTOR
63 CONNECTOR
68 CONNECTOR ASSEMBLY
69 CONNECTOR ASSEMBLY
70 CONNECTOR ASSEMBLY
79 CONTROL PANEL
173 DISCONNECT PLUG
201 DYNAMOTOR
22 FM RECEIVER TRANSMITTER
292 MOUNTING
293 MOUNTING
444 SWITCH PANEL

Figure 12–143. Radio set AN/ARC-44 (model CH-34A serial No. 56-4284 through 56-4314, 56-4317 through 56-4319, and 56-4321 through 56-4342) (Sheet 1 of 2)

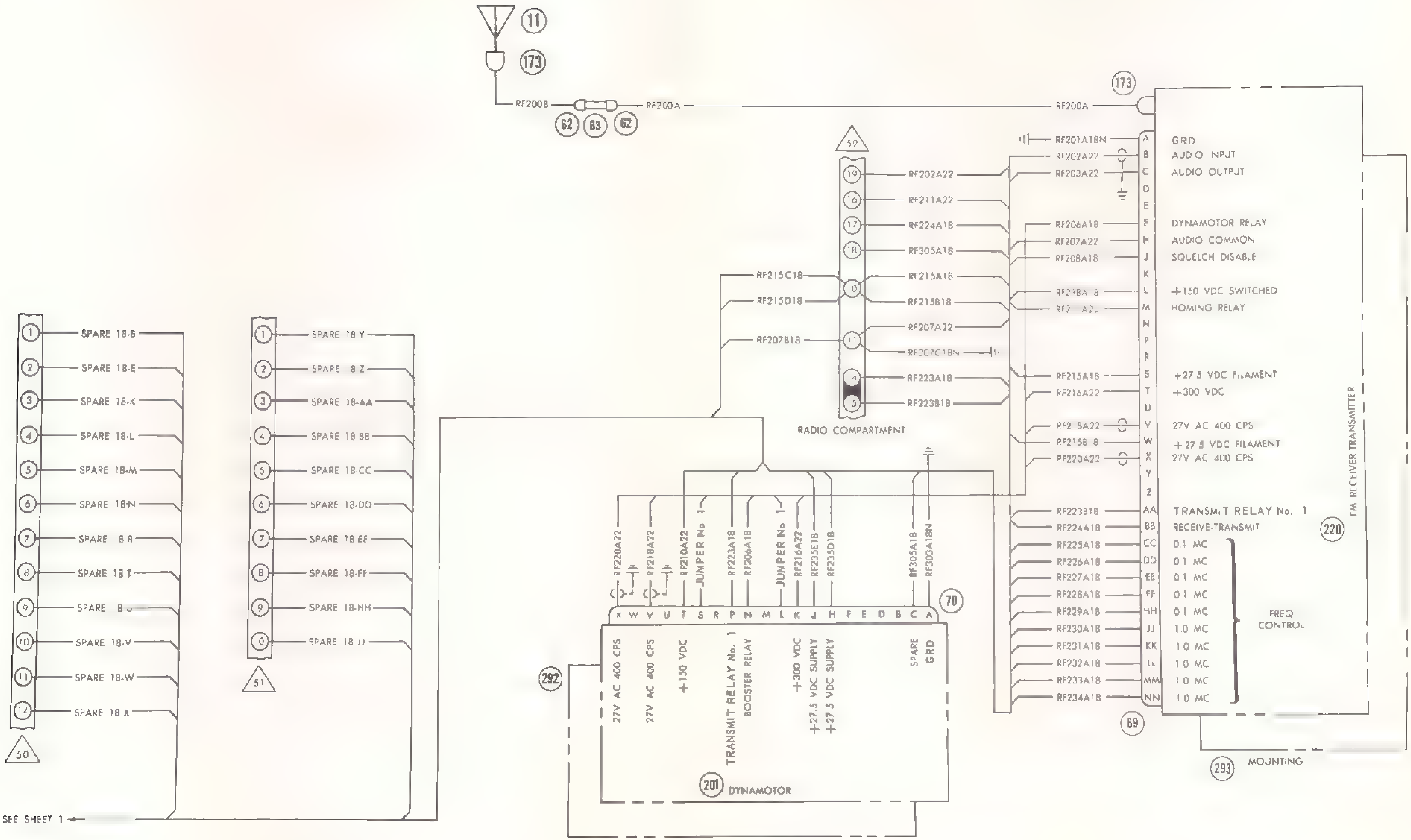
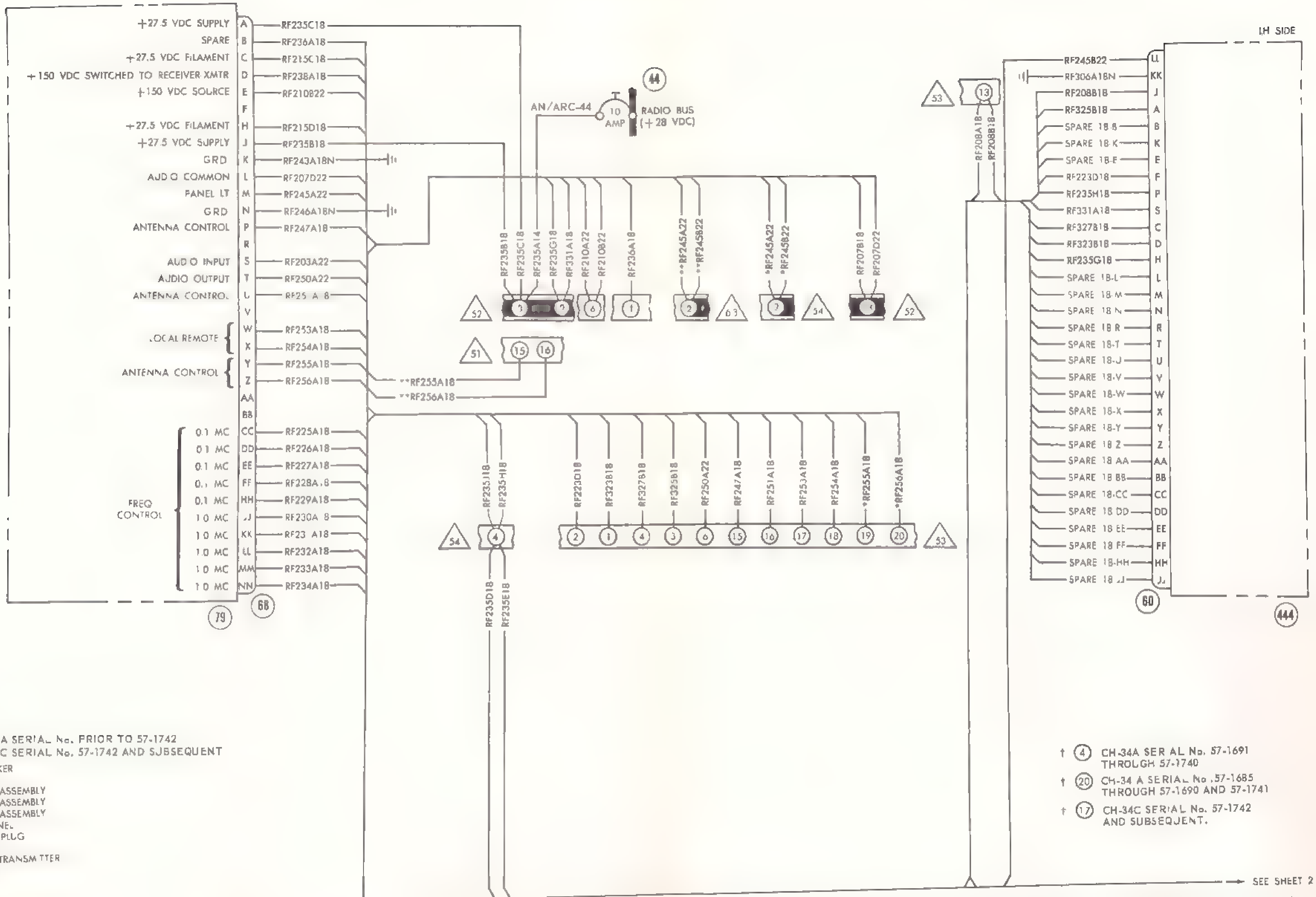


Figure 12–143. Radio set AN/ARC-44 (model CH 34A serial No. 56-4284 through 56-4314, 56-4317 through 56-4319, and 56 4321 through 56-4342) (Sheet 2 of 2)



*MODEL CH-34A SERIAL No. PRIOR TO 57-1742
**MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT

44. CIRCUIT BREAKER
60. CONNECTOR
68. CONNECTOR ASSEMBLY
69. CONNECTOR ASSEMBLY
70. CONNECTOR ASSEMBLY
79. CONTROL PANEL
173. DISCONNECT PLUG
20. DYNAMOTOR
220. FM RECEIVER TRANSMITTER
292. MOUNTING
293. MOUNTING
346. RELAY
354. RELAY
444. SWITCH PANEL

† (4) CH-34A SERIAL No. 57-1691 THROUGH 57-1740
† (20) CH-34 A SERIAL No. 57-1685 THROUGH 57-1690 AND 57-1741
† (17) CH-34C SERIAL No. 57-1742 AND SUBSEQUENT.

Figure 12–144. Radio set AN/ARC 44 (model CH 34A serial No. 57-1685 through 57-1741 and model CH-34C serial No. 57 1742 and subsequent) (Sheet 1 of 2)

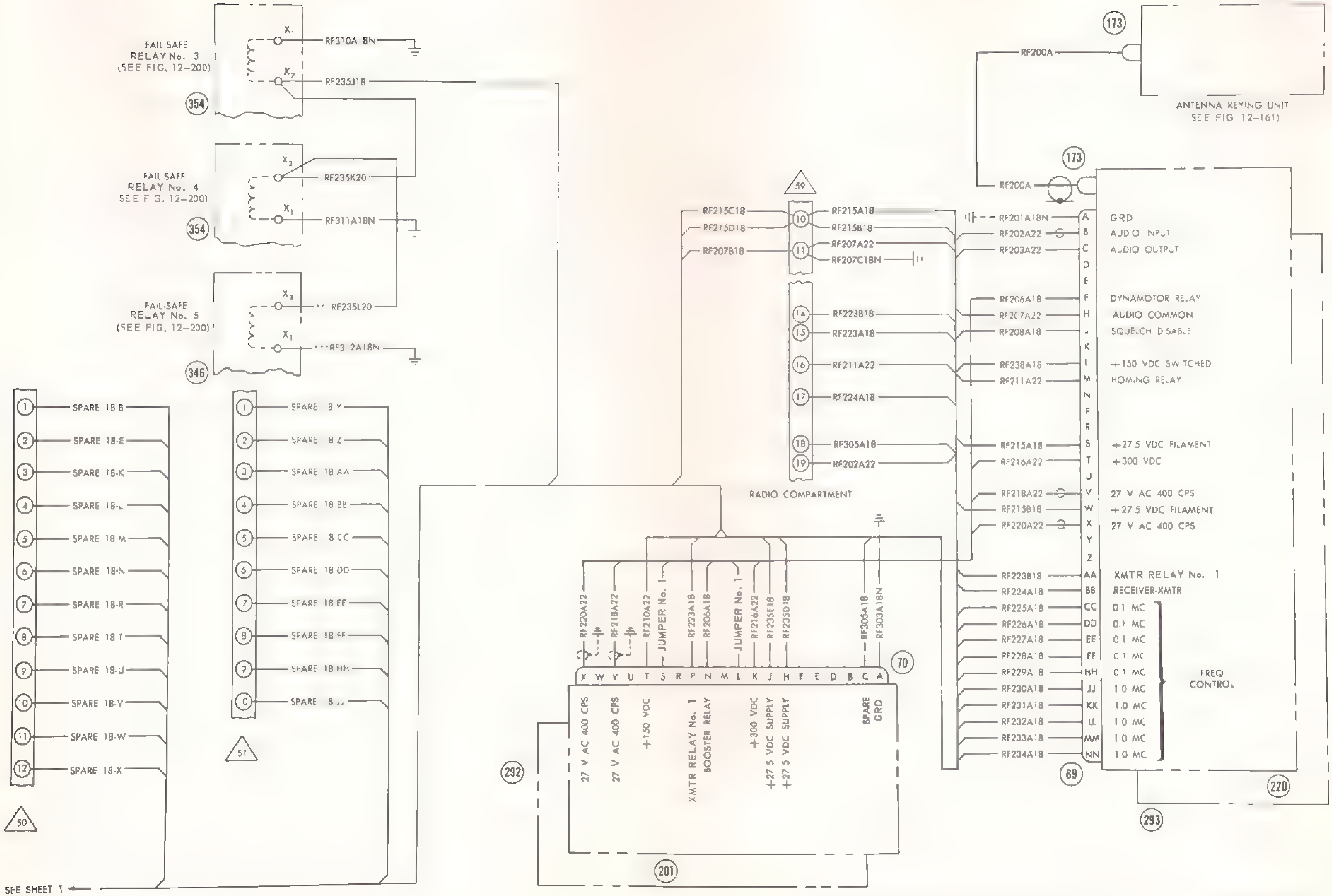


Figure 12-144. Radio set AN/ARC-44 (model CH-34A serial No. 57-1685 through 57-1741 and model CH-34C serial No. 57-1742 and subsequent) (Sheet 2 of 2)

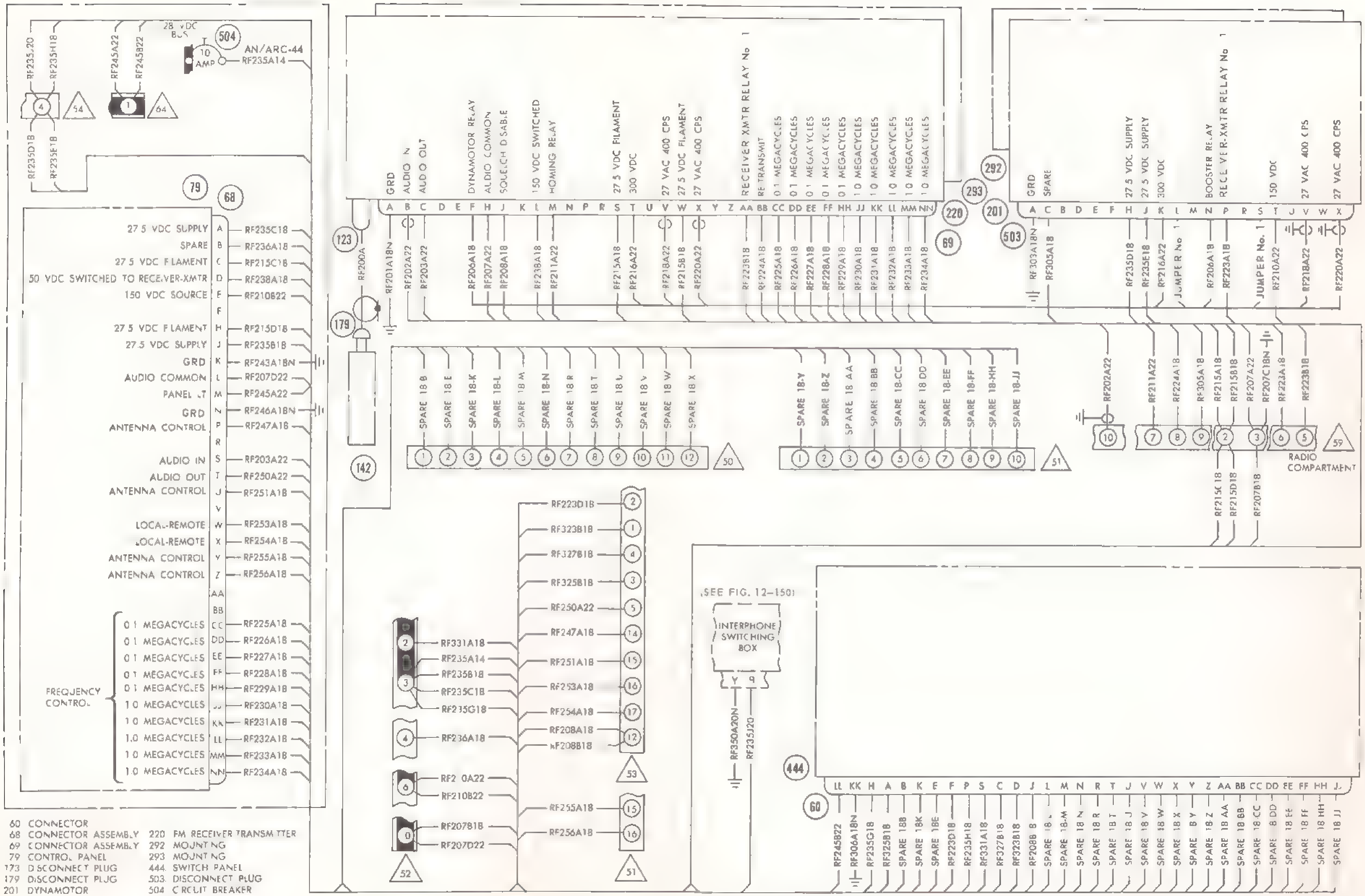
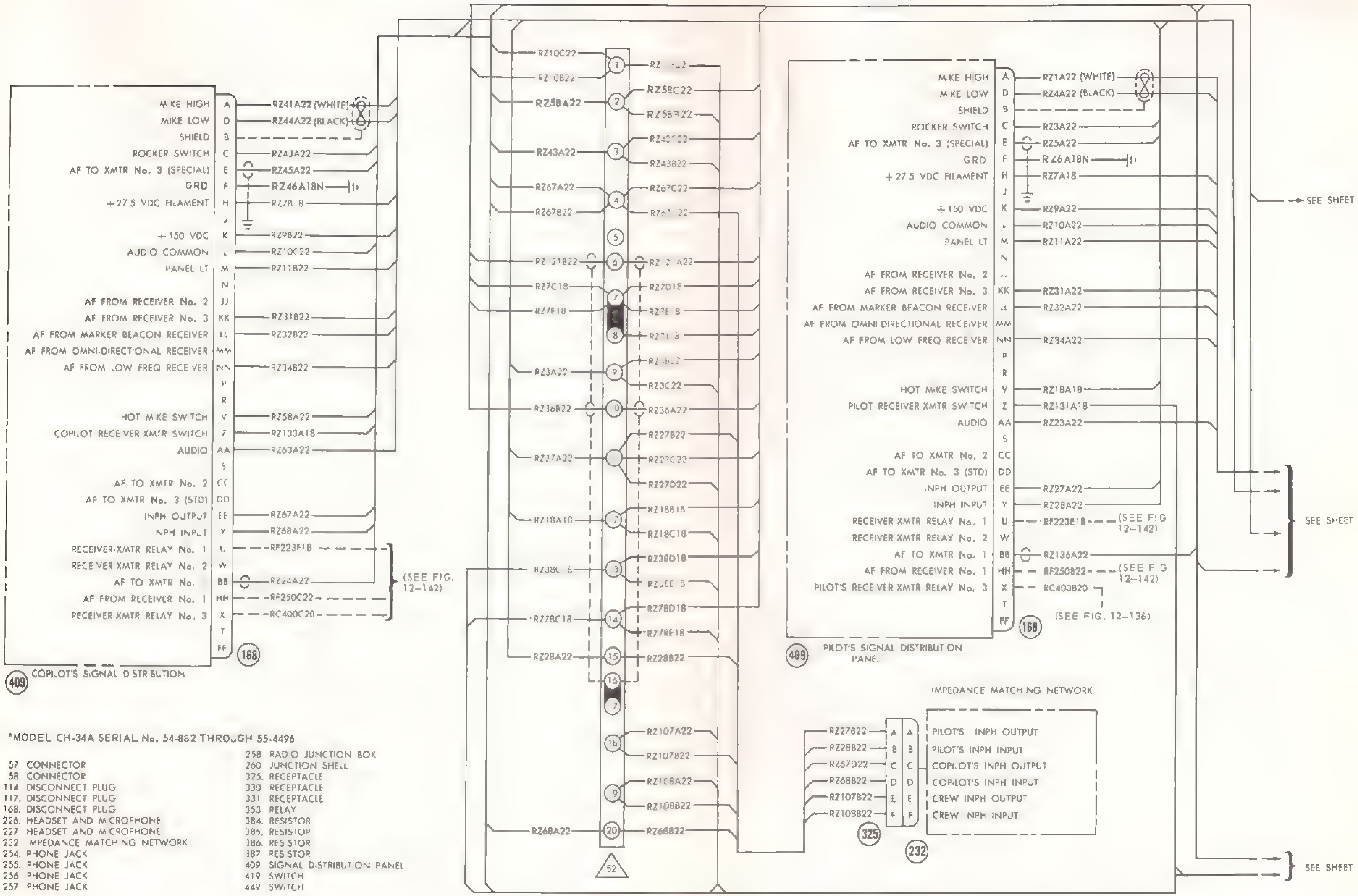


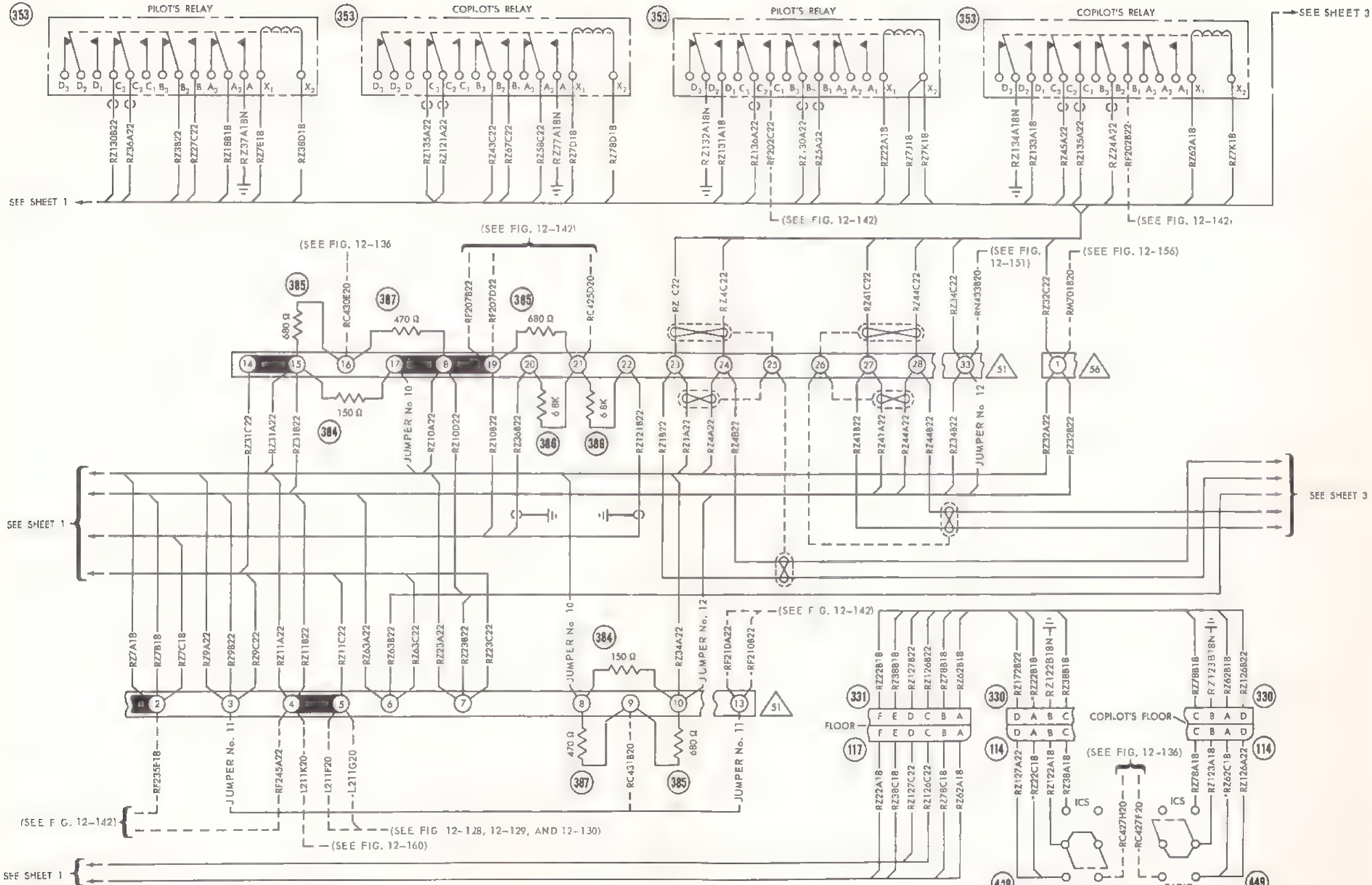
Figure 12—145. Radio set AN/ARC-44 (model CH-34C serial No. prior to 57-1742)



*MODEL CH-34A SERIAL No. 54-882 THROUGH 55-4496

57 CONNECTOR
58 CONNECTOR
114 DISCONNECT PLUG
117 DISCONNECT PLUG
168 DISCONNECT PLUG
226 HEADSET AND MICROPHONE
227 HEADSET AND MICROPHONE
232 IMPEDANCE MATCHING NETWORK
254 PHONE JACK
255 PHONE JACK
256 PHONE JACK
257 PHONE JACK
258 RADIO JUNCTION BOX
260 JUNCTION SHELL
325 RECEPTACLE
330 RECEPTACLE
331 RECEPTACLE
353 RELAY
384 RESISTOR
385 RESISTOR
386 RESISTOR
387 RESISTOR
409 SIGNAL DISTRIBUTION PANEL
419 SWITCH
449 SWITCH

Figure 12–146. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 58-882 through 55-4504) (Sheet 1 of 4)



*MODEL CH-34A SERIAL No. 54-882 THROUGH 55-4496

Figure 12-146. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 58-882 through 55-4504) (Sheet 2 of 4)

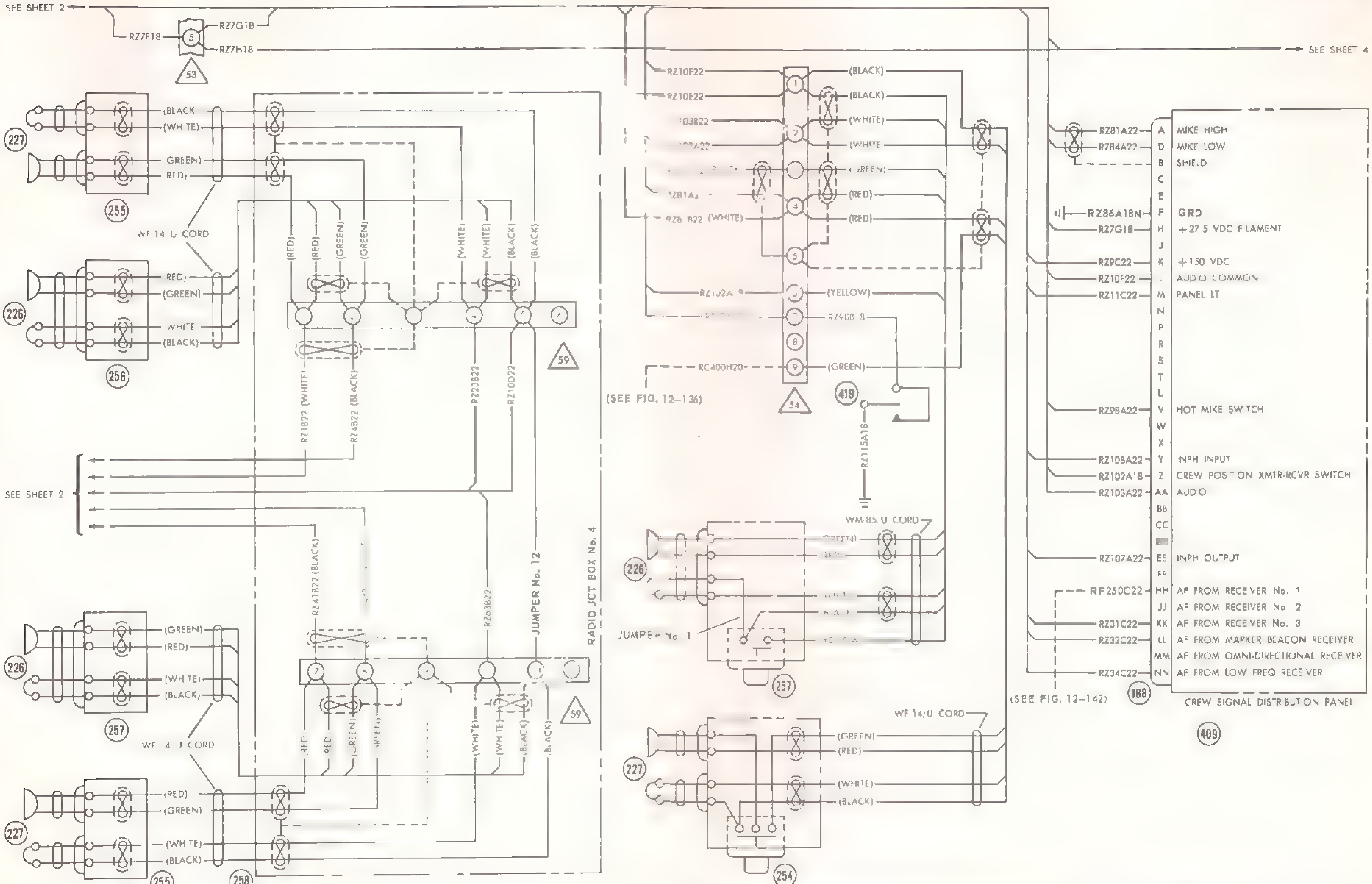
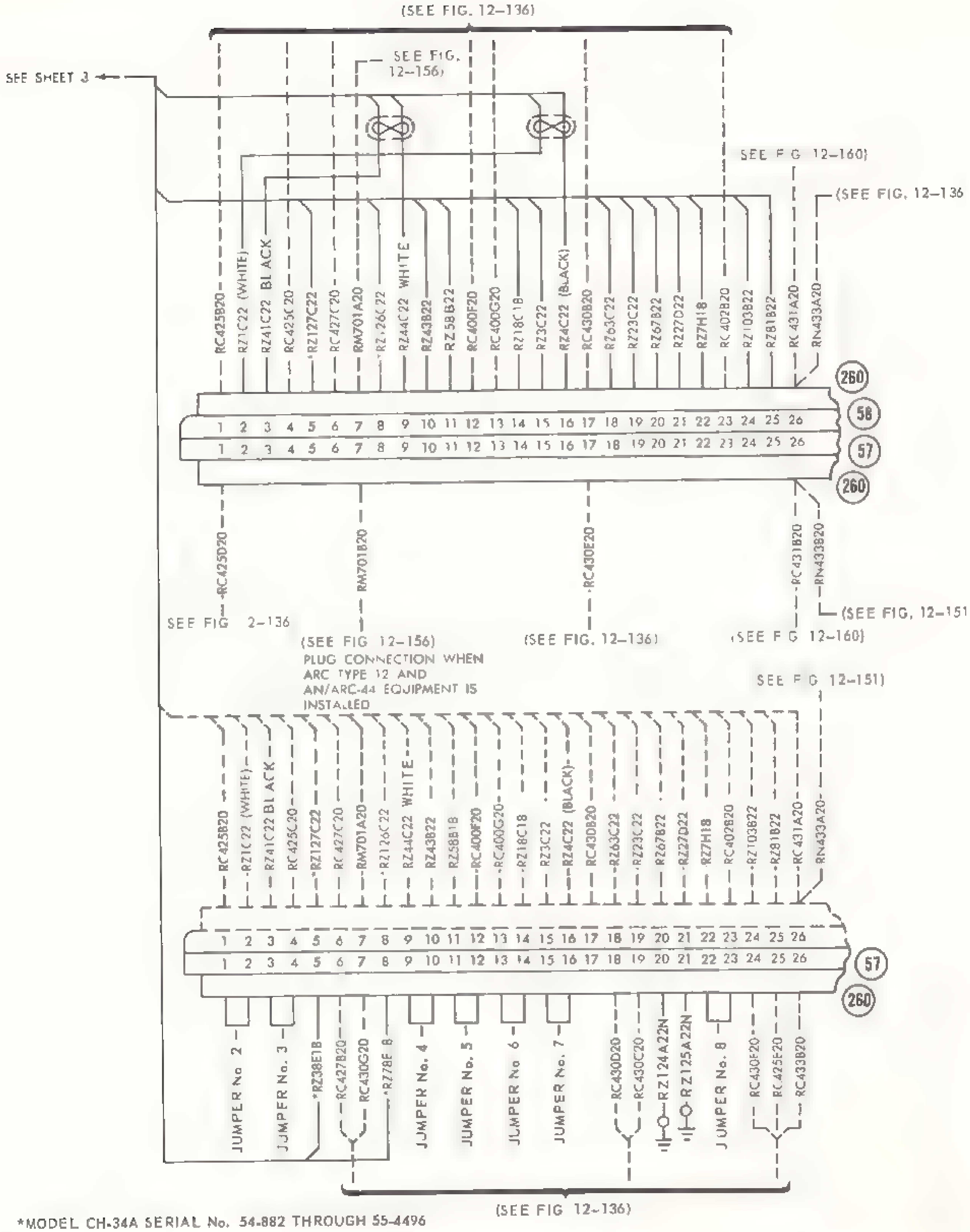
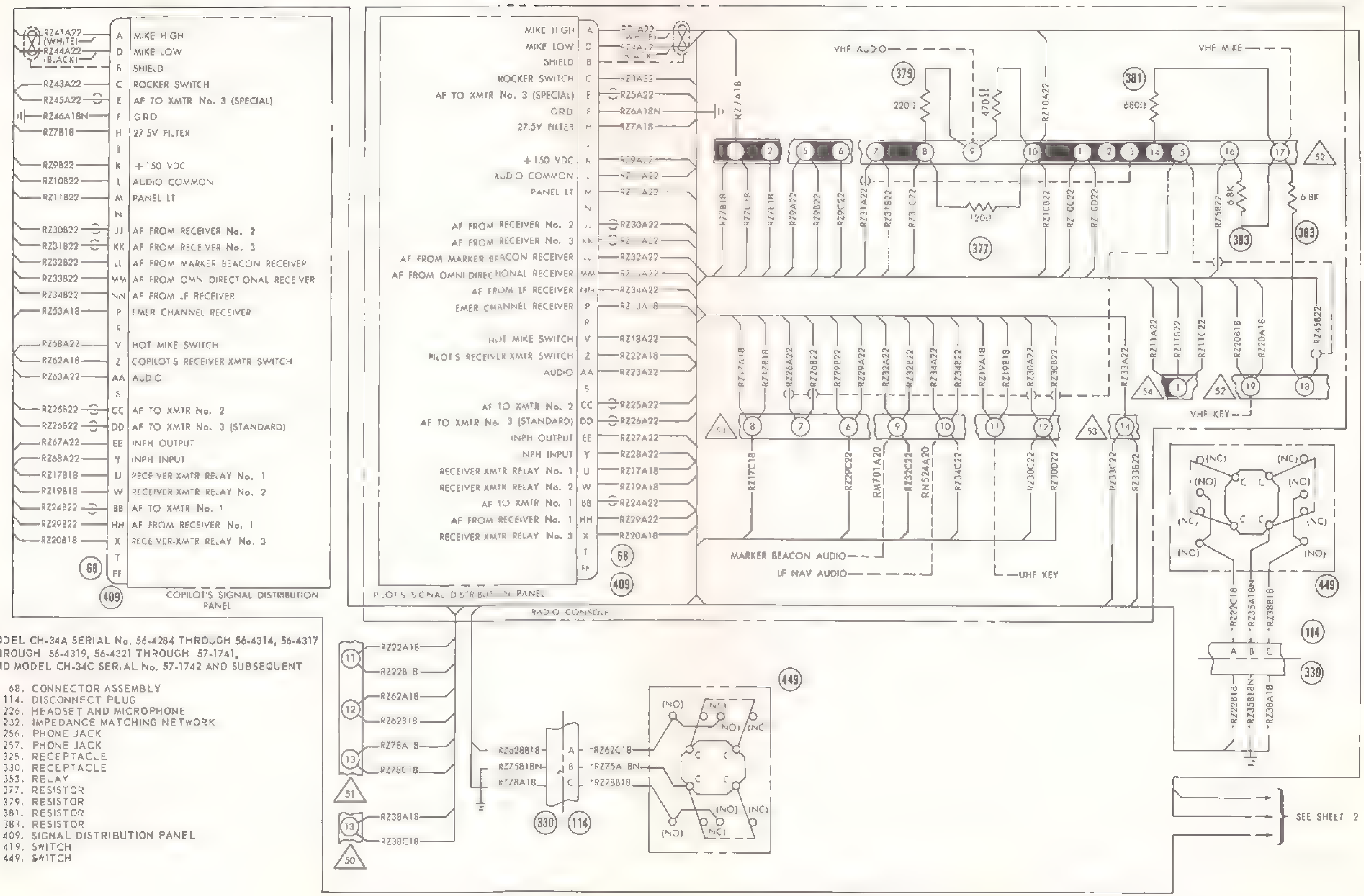


Figure 12-146. Radio set (ICS) AN/ARC-44 (model CH 34A serial No. 58-882 through 55 4504) (Sheet 3 of 4)



*MODEL CH-34A SERIAL No. 54-882 THROUGH 55-4496

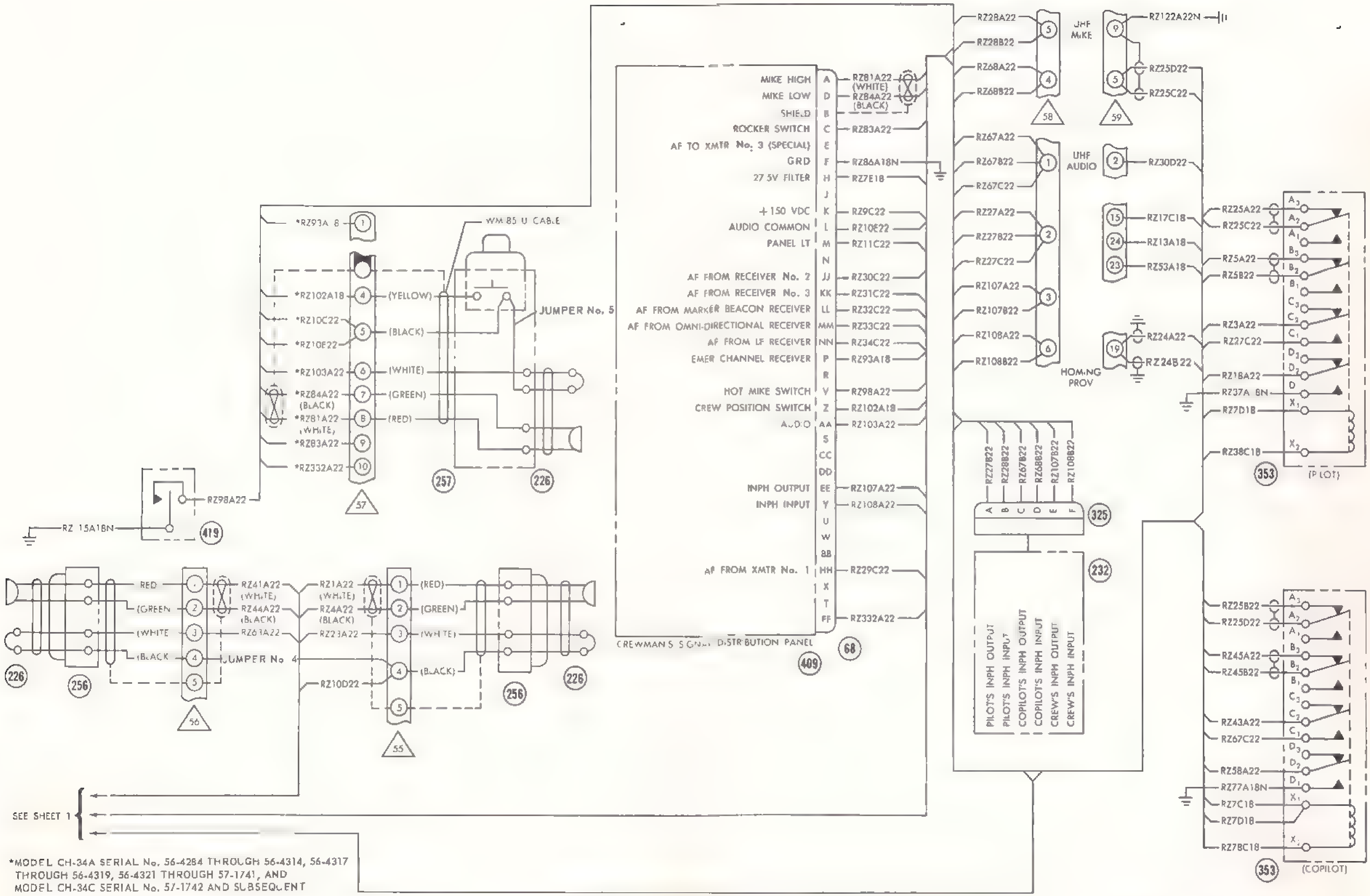
Figure 12–146 Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 58-882 through 55-4504) (Sheet 4 of 4)



*MODEL CH-34A SERIAL No. 56-4284 THROUGH 56-4314, 56-4317 THROUGH 56-4319, 56-4321 THROUGH 57-1741, AND MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT

68. CONNECTOR ASSEMBLY
114. DISCONNECT PLUG
226. HEADSET AND MICROPHONE
232. IMPEDANCE MATCHING NETWORK
256. PHONE JACK
257. PHONE JACK
325. RECEPTACLE
330. RECEPTACLE
353. RELAY
377. RESISTOR
379. RESISTOR
381. RESISTOR
383. RESISTOR
409. SIGNAL DISTRIBUTION PANEL
419. SWITCH
449. SWITCH

Figure 12–147. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 56-4284 through 56-4342 (Sheet 1 of 2)



*MODEL CH-34A SERIAL No. 56-4284 THROUGH 56-4314, 56-4317 THROUGH 56-4319, 56-4321 THROUGH 57-1741, AND MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT

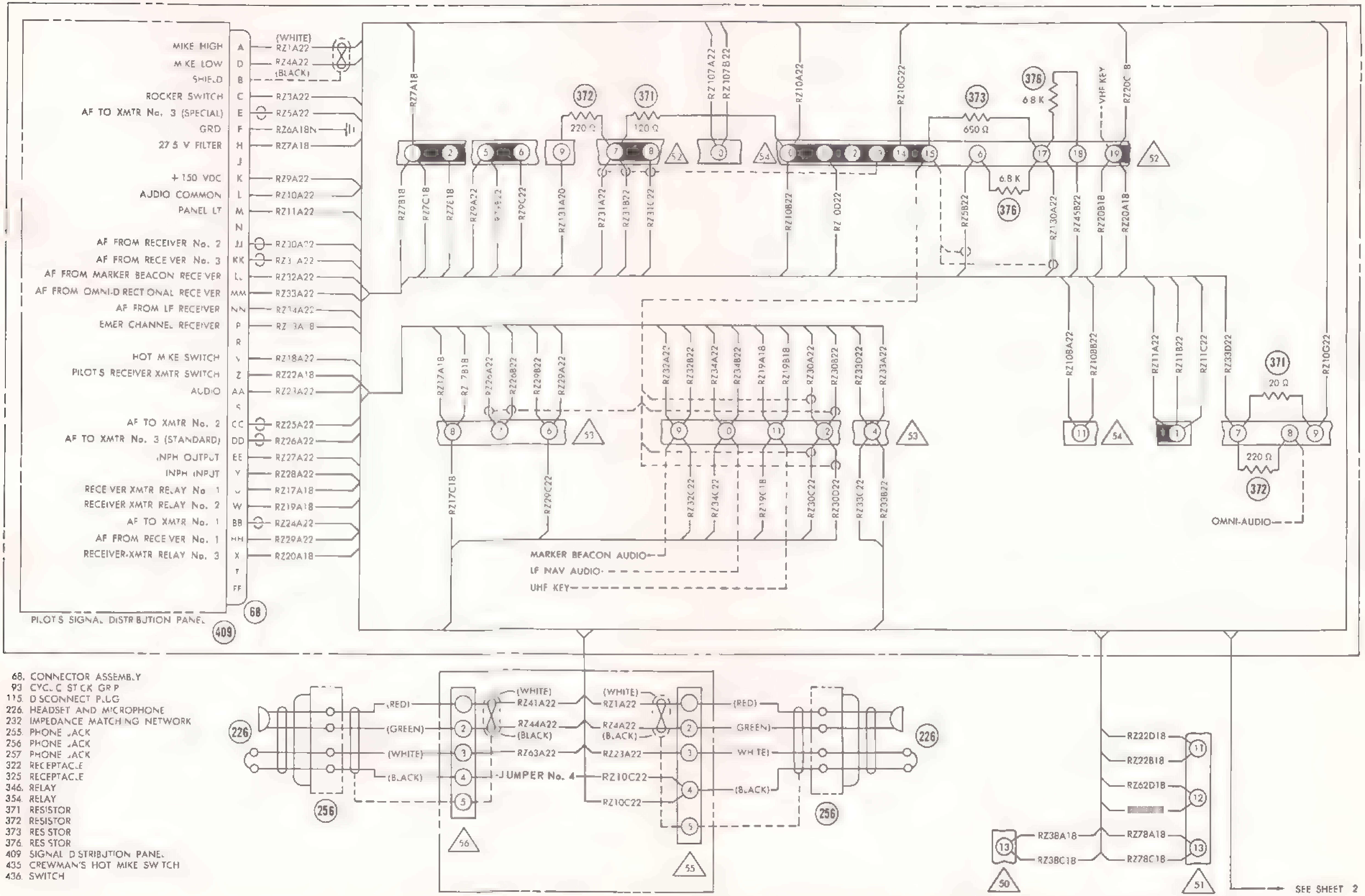
Figure 12–147. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 56-4284 through 56-4342 (Sheet 2 of 2)

*MODEL CH-34A SERIAL No. PRIOR TO 57-1742
**MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT

68. CONNECTOR ASSEMBLY
226. HEADSET AND MICROPHONE
232. IMPEDANCE MATCHING NETWORK
255 PHONE JACK
256 PHONE JACK
257. PHONE JACK
325 RECEPTACLE
354. RELAY
371 RESISTOR
372 RESISTOR
409. SIGNAL DISTRIBUTION PANEL
435. CREWMAN'S HOT MIKE SWITCH

Figure 12–148. Radio set (ICS) AN/ARC-44 (model CH 34A serial No. 57-1685 through 57-1690, 57-1726 through 57-1741 and, model CH-34C serial No. 57-1742 and subsequent) (Sheet 1 of 2)

Figure 12–148. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 57-1685 through 57-1690, 57-1726 through 57-1741 and, model CH 34C serial No. 57-1742 and subsequent) (Sheet 2 of 2)



68. CONNECTOR ASSEMBLY
93. CYCLIC STICK GRIP
115. DISCONNECT PLUG
226. HEADSET AND MICROPHONE
232. IMPEDANCE MATCHING NETWORK
255. PHONE JACK
256. PHONE JACK
257. PHONE JACK
322. RECEPTACLE
325. RECEPTACLE
346. RELAY
354. RELAY
371. RESISTOR
372. RESISTOR
373. RESISTOR
376. RESISTOR
409. SIGNAL DISTRIBUTION PANEL
435. CREWMAN'S HOT MIKE SWITCH
436. SWITCH

Figure 12–149. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 57-1691 through 57-1725) (Sheet 1 of 3)

Figure 12-149. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 57-1691 through 57-1725) (Sheet 2 of 3)

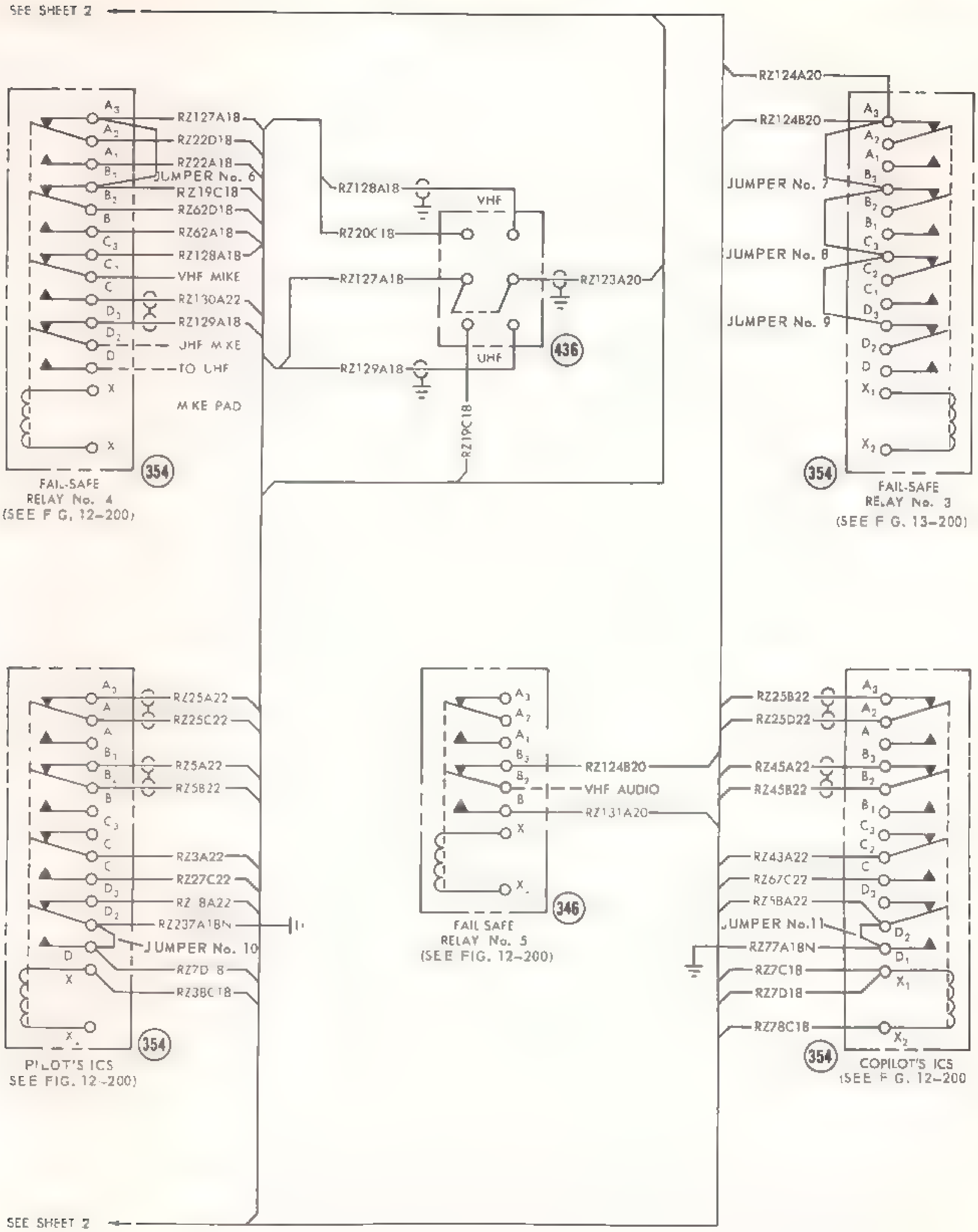
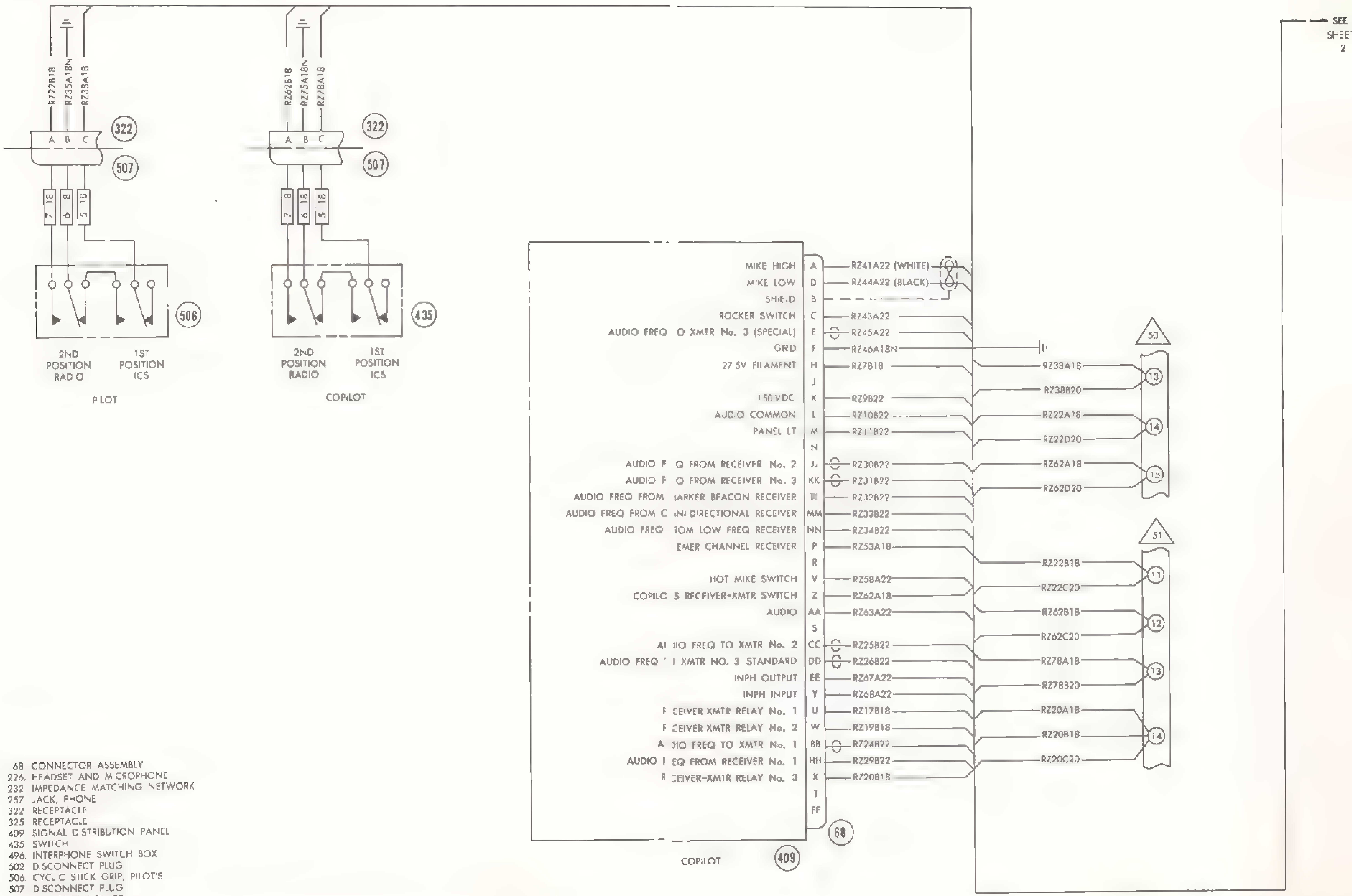


Figure 12–149. Radio set (ICS) AN/ARC-44 (model CH-34A serial No. 57 1691 through 57-1725) (Sheet 3 of 3)



68 CONNECTOR ASSEMBLY
226. HEADSET AND MICROPHONE
232 IMPEDANCE MATCHING NETWORK
257 JACK, PHONE
322 RECEPTACLE
325 RECEPTACLE
409 SIGNAL DISTRIBUTION PANEL
435 SWITCH
496. INTERPHONE SWITCH BOX
502 DISCONNECT PLUG
506. CYCLIC STICK GRIP, PILOT'S
507 DISCONNECT PLUG
508. PERMANENT SPLICE

Figure 12—150. Radio set (ICS) AN/ARC-44 (model CH-34C serial No. prior to 57-1742) (Sheet 1 of 4)

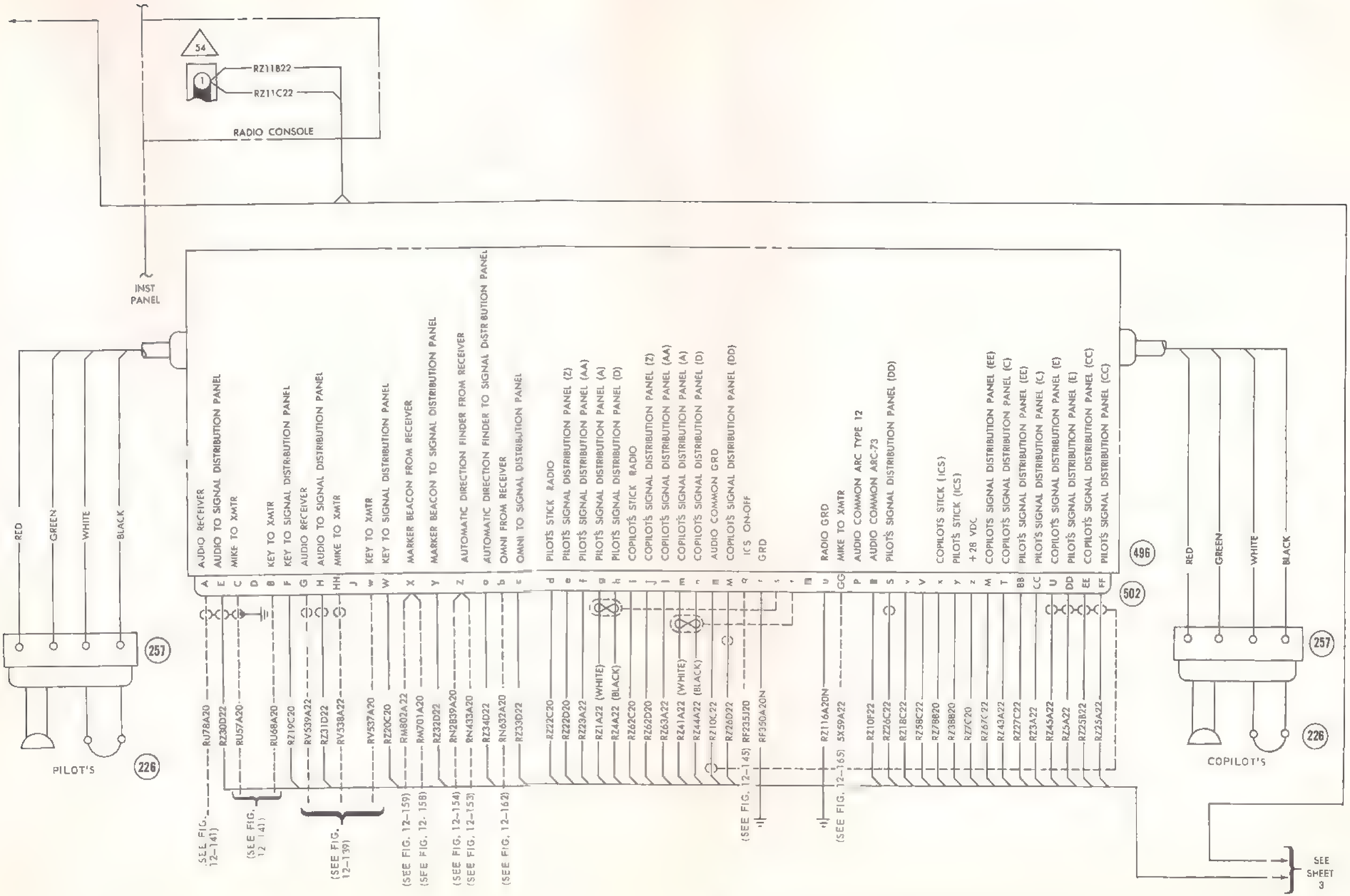


Figure 12–150. Radio set (ICS) AN/ARC-44 (model CH-34C serial No. prior to 47 1742) (Sheet 2 of 4)

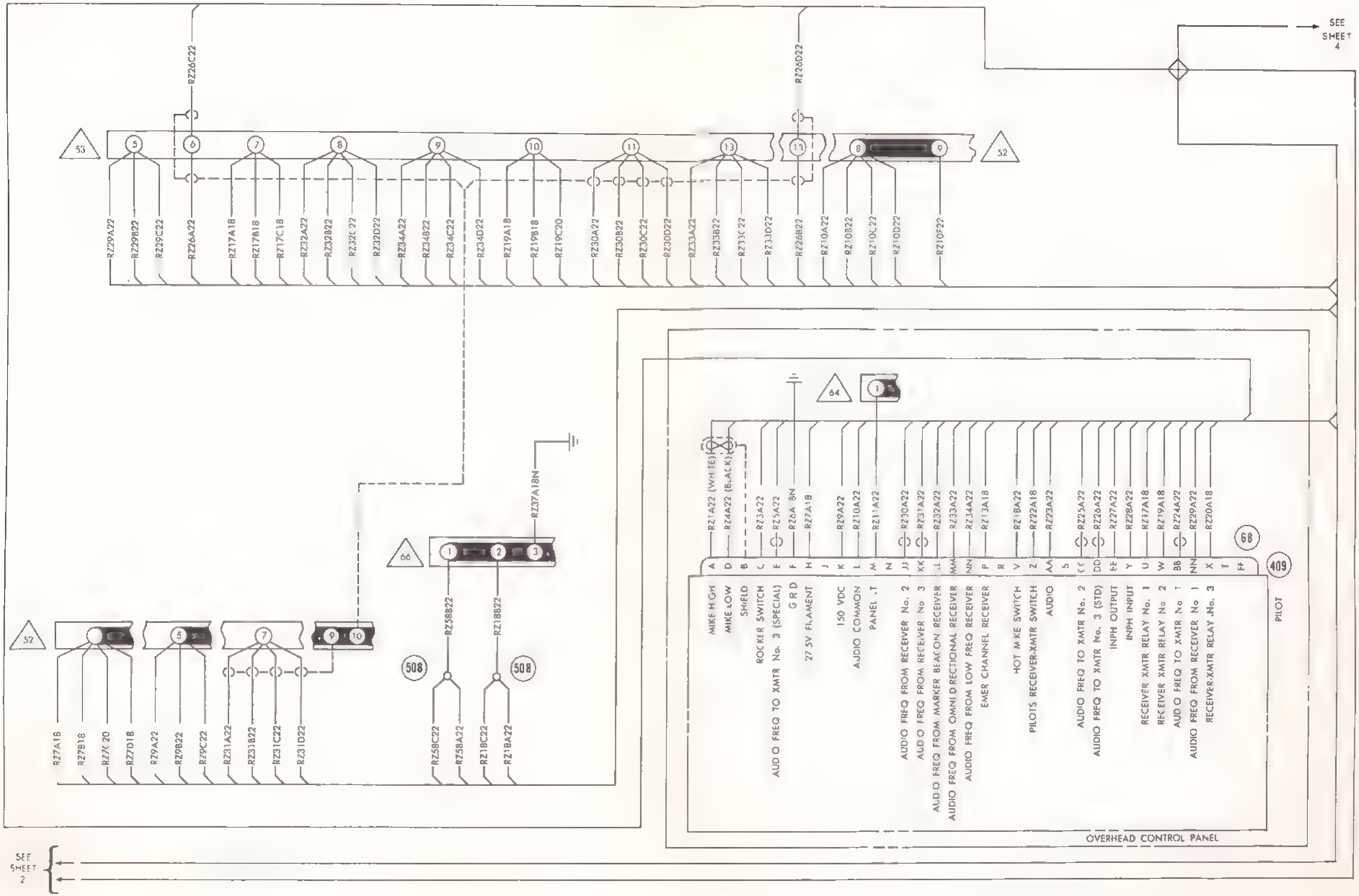


Figure 12—150. Radio set (ICS) AN/ARC-44 (model CH-34C serial No. prior to 47-1742) (Sheet 3 of 4)

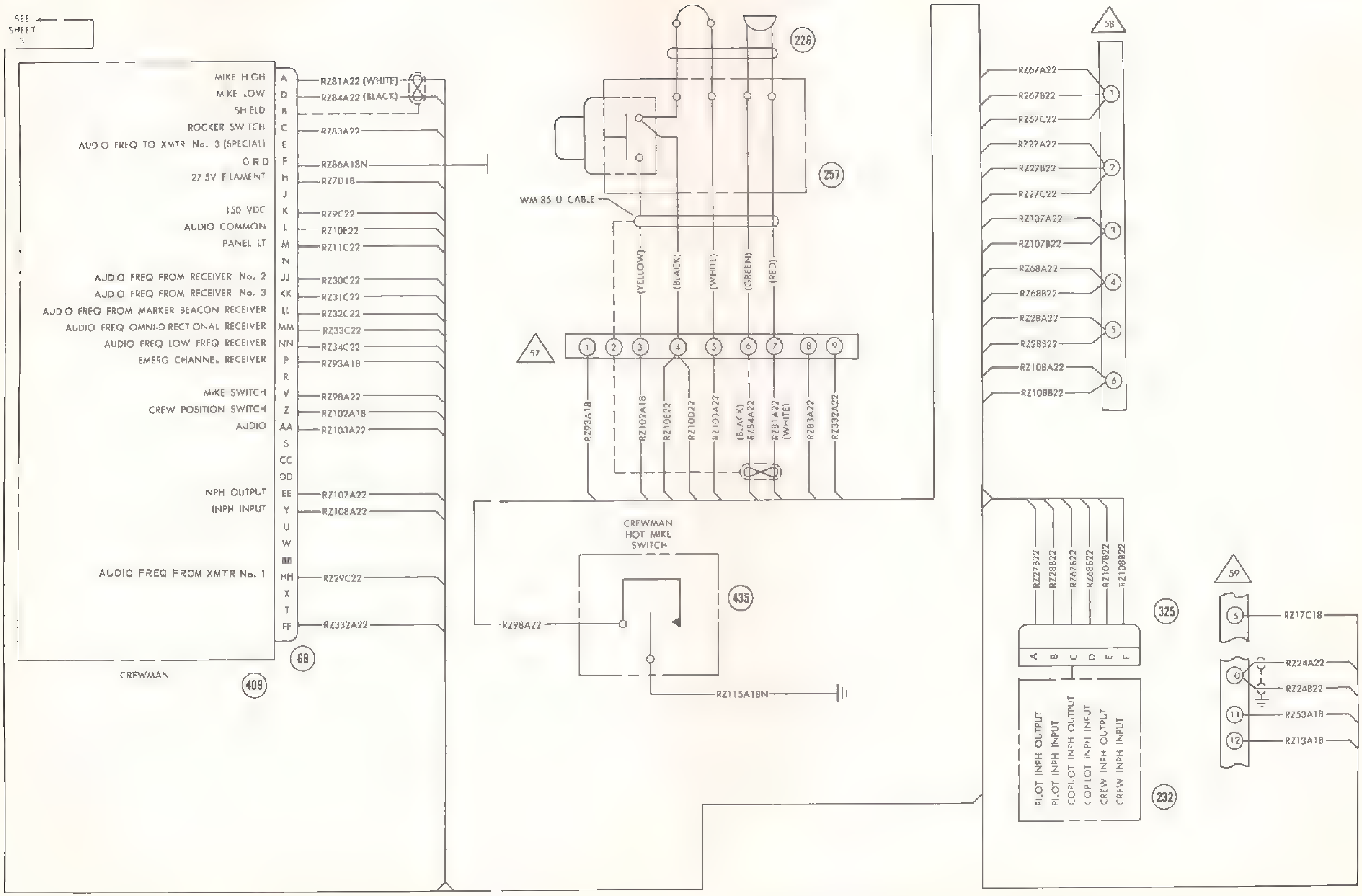
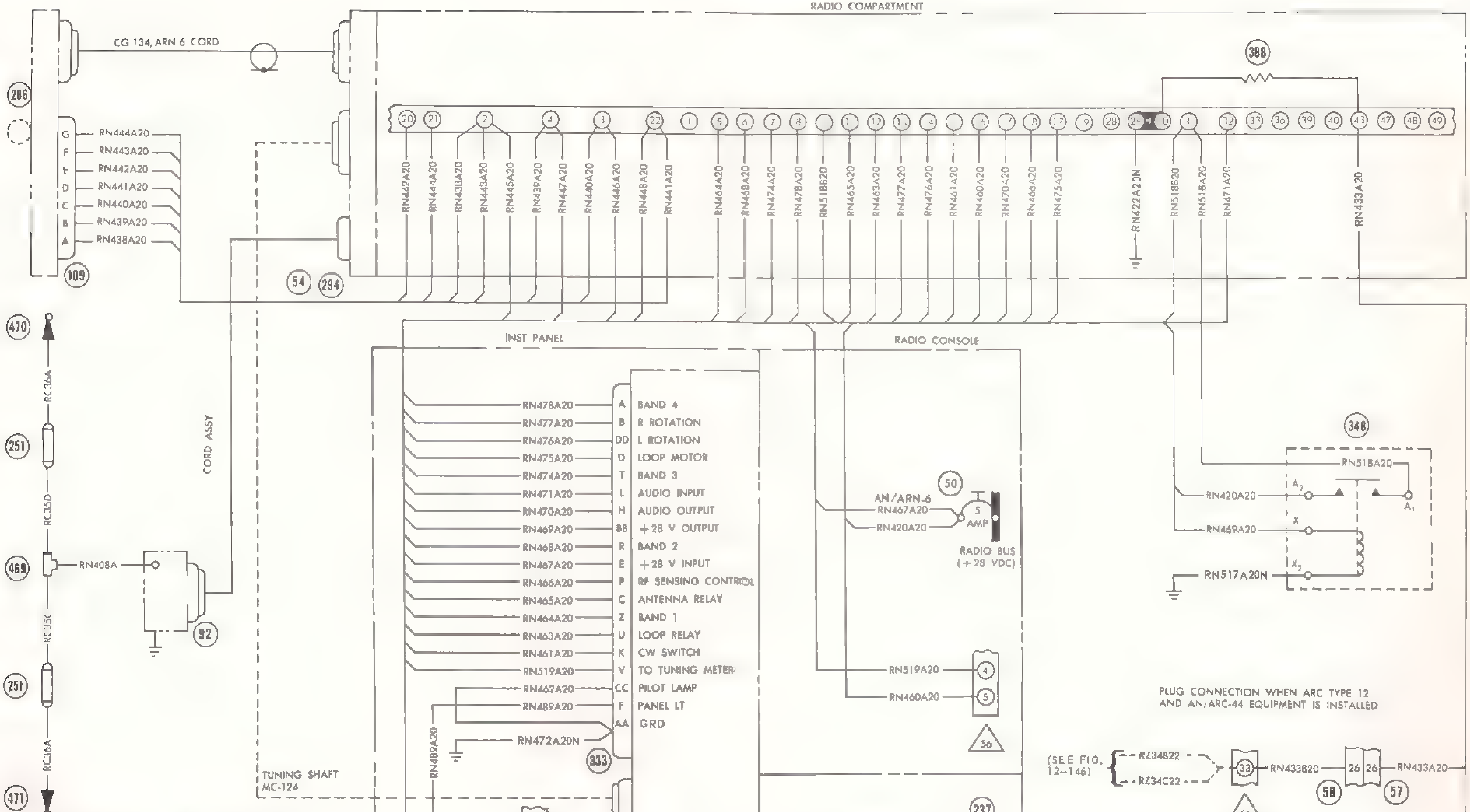
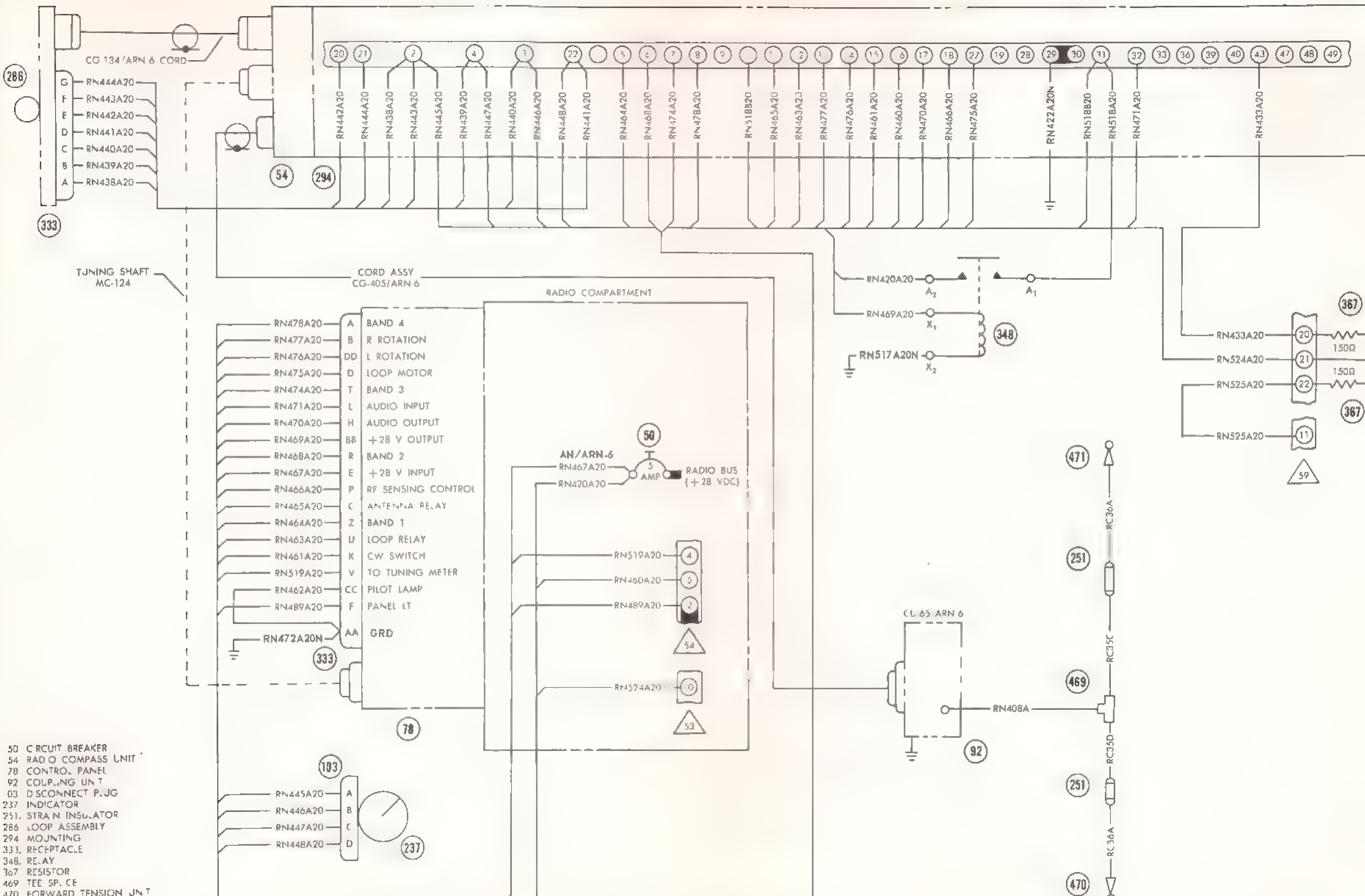


Figure 12–150. Radio set (ICS) AN/ARC-44 (model CH-34C serial No. prior to 47-1742) (Sheet 4 of 4)



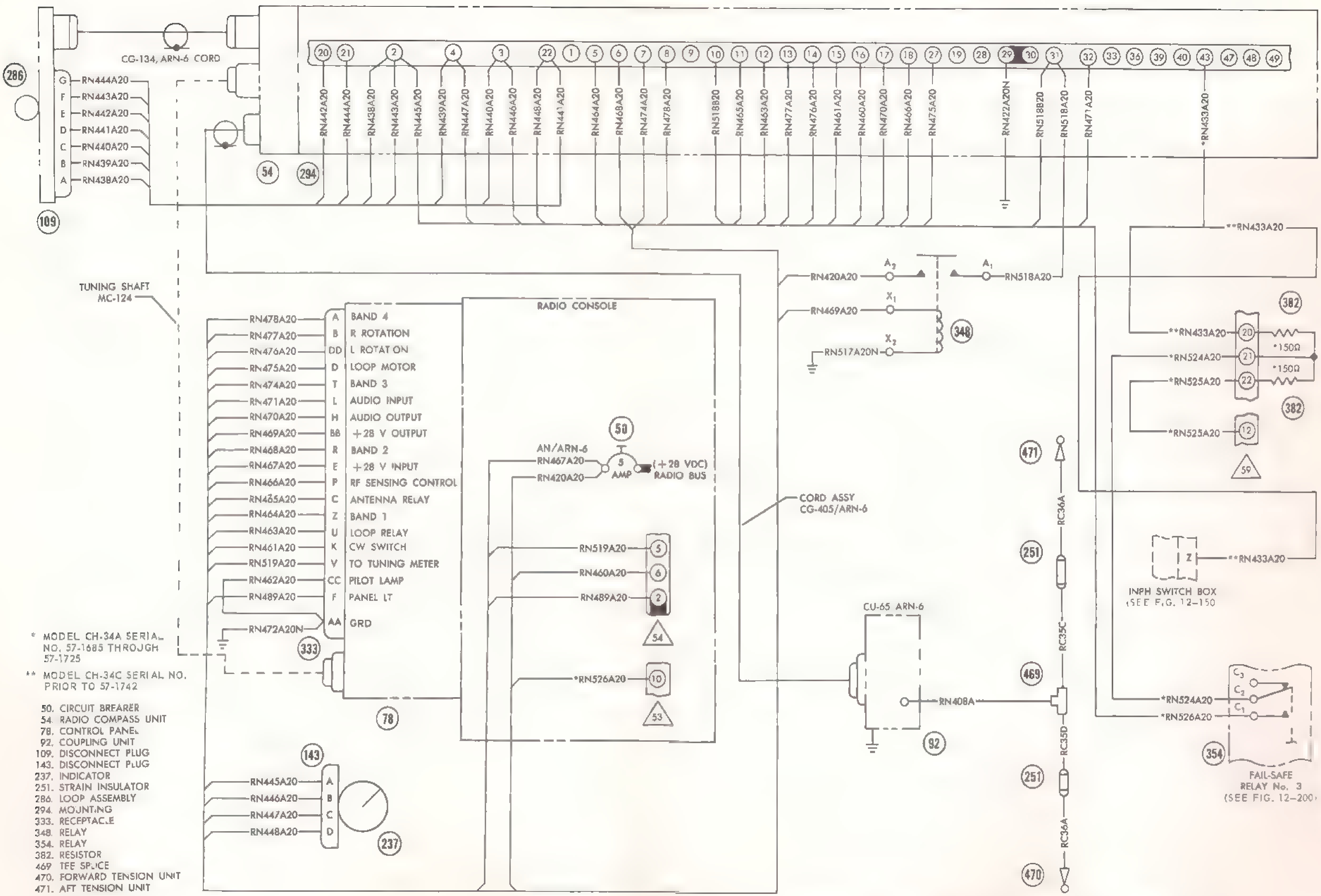
50. CIRCUIT BREAKER
54. RADIO COMPASS UNIT
57. CONNECTOR
58. CONNECTOR
78. CONTROL PANEL
92. COUPLING UNIT
103. DISCONNECT PLUG
109. DISCONNECT PLUG
237. INDICATOR
251. STRAIN INSULATOR
286. LOOP ASSEMBLY
294. MOUNTING
333. RECEPTACLE
348. RELAY
388. RESISTOR
469. TEE SPLICE
470. FORWARD TENSION UNIT
471. AFT TENSION UNIT

Figure 12–151. Radio compass AN/ARN-6 (model CH-34A serial No. 54-3034 through 55-4505)



50 CIRCUIT BREAKER
54 RADIO COMPASS UNIT
78 CONTROL PANEL
92 COUPLING UNIT
103 DISCONNECT PLUG
237 INDICATOR
251. STRAIN INSULATOR
286 LOOP ASSEMBLY
294 MOUNTING
333. RECEPTACLE
348. RELAY
367 RESISTOR
469 TEE SPLICE
470 FORWARD TENSION UNIT
471 AFT TENSION UNIT

Figure 12–152. Radio compass AN/ARN-6 (model CH-34A serial No. 56 4284 through 56-4342)

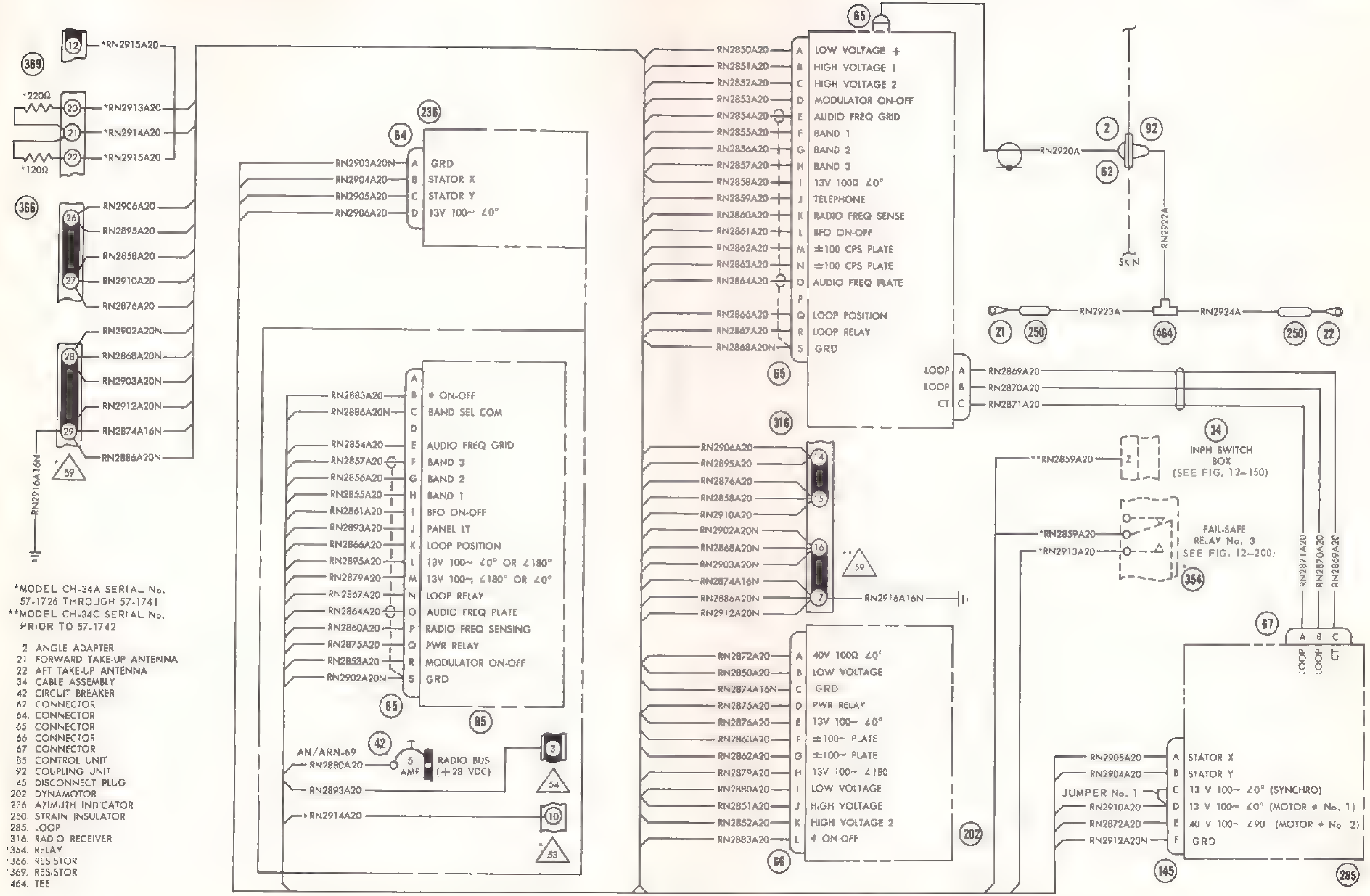


* MODEL CH-34A SERIAL NO. 57-1685 THROUGH 57-1725

** MODEL CH-34C SERIAL NO. PRIOR TO 57-1742

50. CIRCUIT BREAKER
54. RADIO COMPASS UNIT
78. CONTROL PANEL
92. COUPLING UNIT
109. DISCONNECT PLUG
143. DISCONNECT PLUG
237. INDICATOR
251. STRAIN INSULATOR
286. LOOP ASSEMBLY
294. MOUNTING
333. RECEPTACLE
348. RELAY
354. RELAY
382. RESISTOR
469. TEE SPLICE
470. FORWARD TENSION UNIT
471. AFT TENSION UNIT

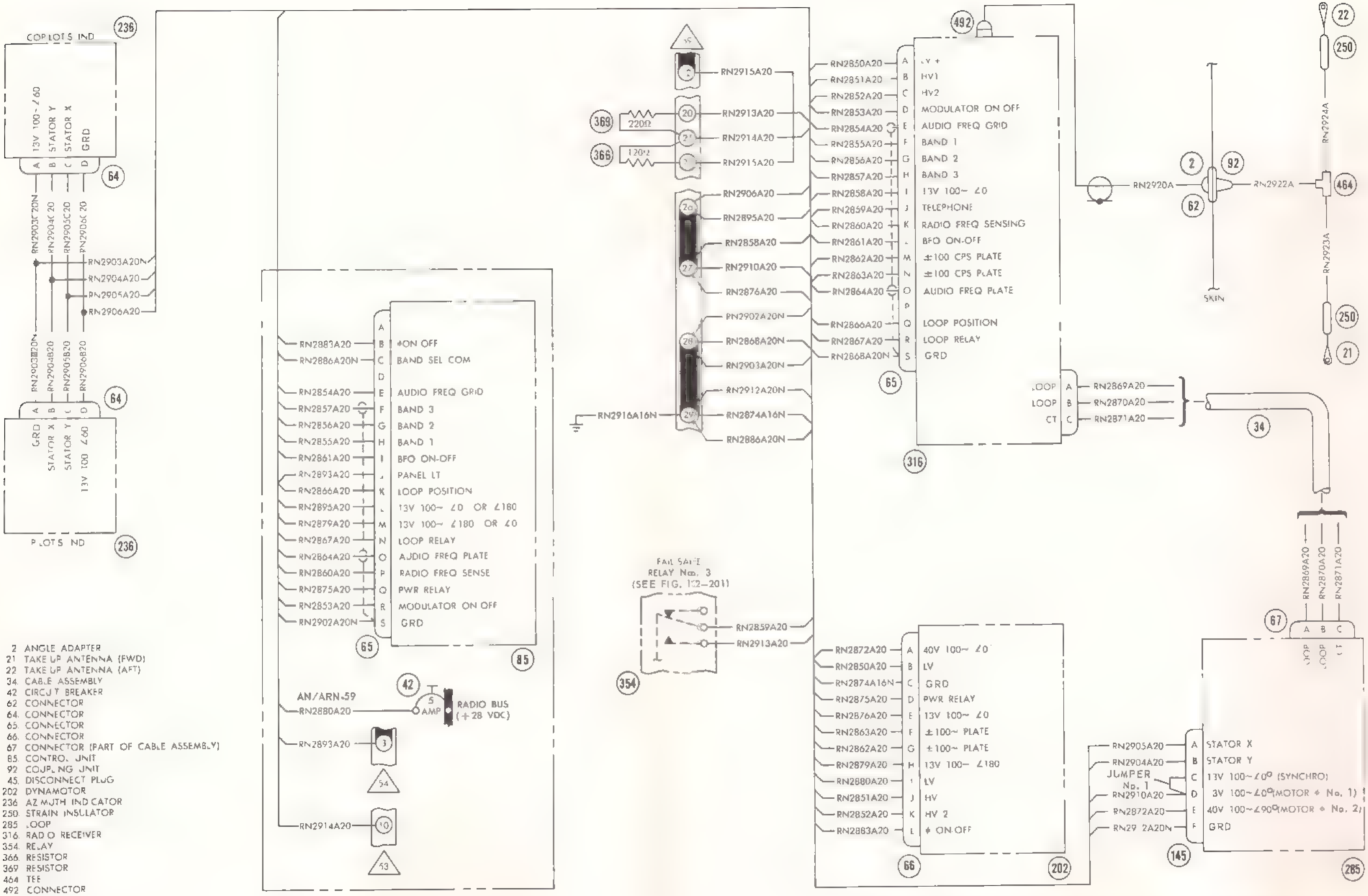
Figure 12–153. Radio compass AN/ARN-6 (model CH-34A serial No. 57-1685 through 57-1725 and model CH-34C serial No. prior to 57-1742)



*MODEL CH-34A SERIAL No. 57-1726 THROUGH 57-1741
**MODEL CH-34C SERIAL No. PRIOR TO 57-1742

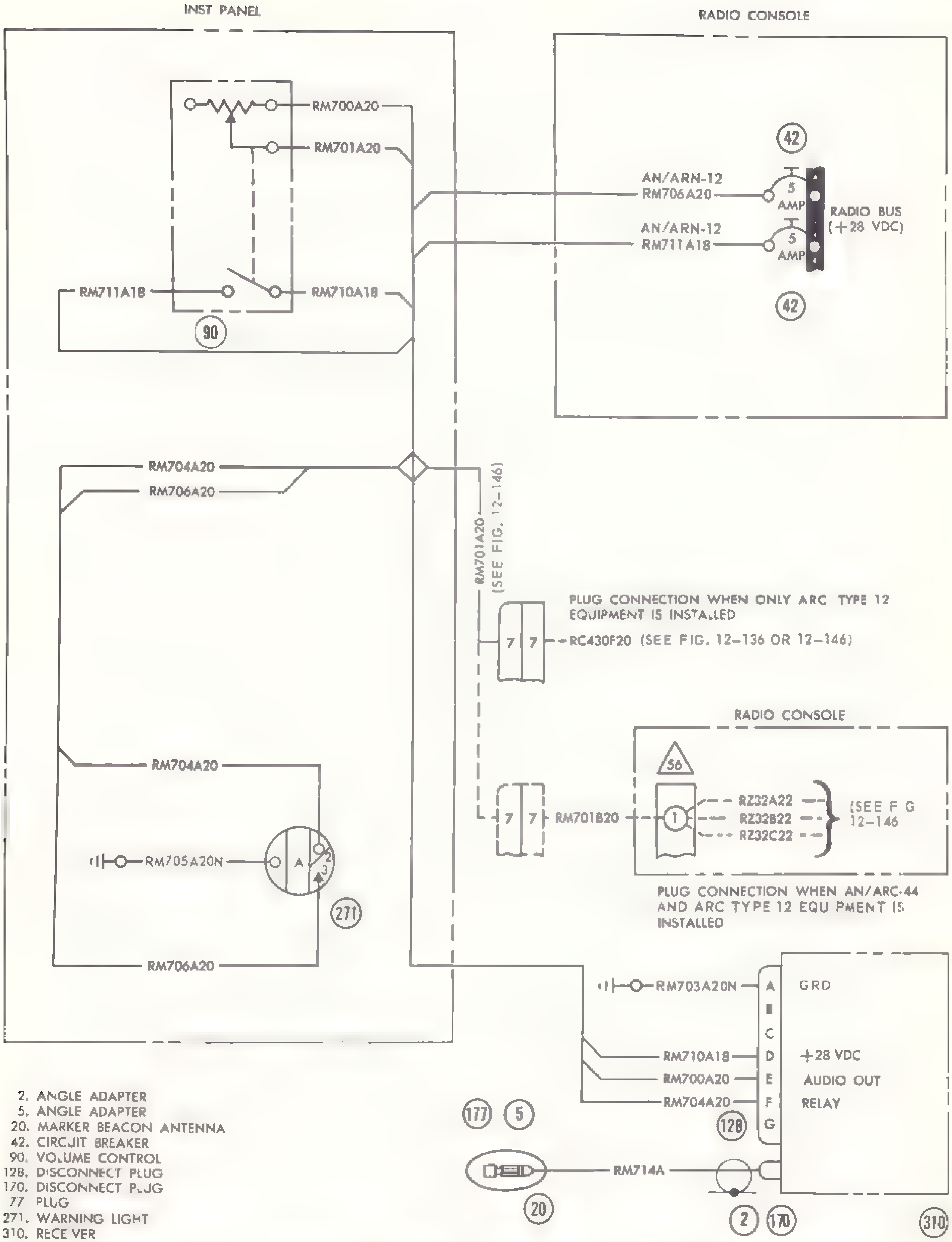
2 ANGLE ADAPTER
21 FORWARD TAKE-UP ANTENNA
22 AFT TAKE-UP ANTENNA
34 CABLE ASSEMBLY
42 CIRCUIT BREAKER
62 CONNECTOR
64. CONNECTOR
65 CONNECTOR
66 CONNECTOR
67 CONNECTOR
85 CONTROL UNIT
92 COUPLING UNIT
45 DISCONNECT PLUG
202 DYNAMOTOR
236 AZIMUTH INDICATOR
250 STRAIN INSULATOR
285 LOOP
316 RADIO RECEIVER
*354 RELAY
*366 RESISTOR
*369 RESISTOR
464 TEE

Figure 12–154. Direction finder set AN/ARN-59 (model CH-34A serial No. 57-1726 through 57-1741 and model CH 34C serial No. prior to 57-1742)



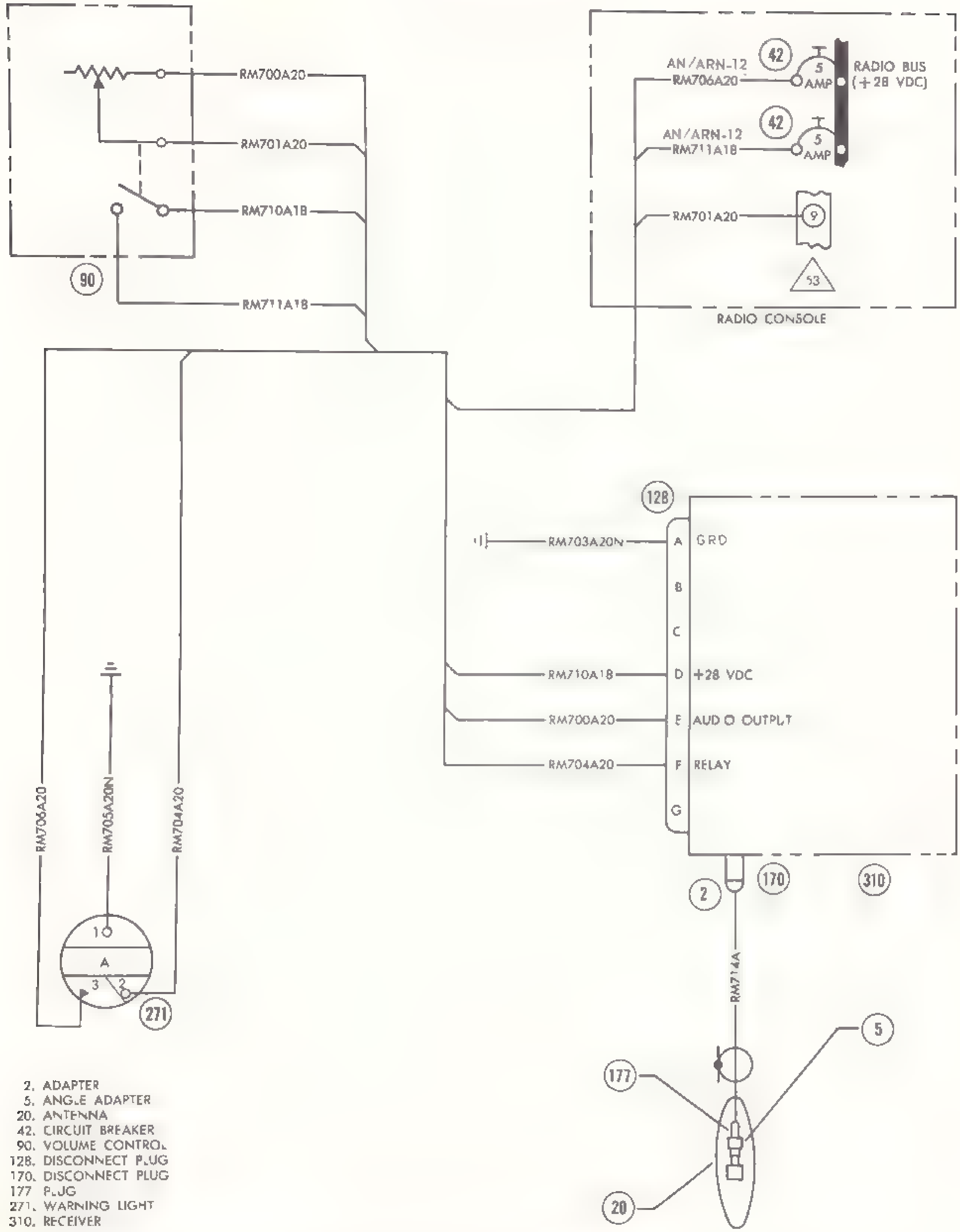
2 ANGLE ADAPTER
21 TAKE UP ANTENNA (FWD)
22 TAKE UP ANTENNA (AFT)
34 CABLE ASSEMBLY
42 CIRCUIT BREAKER
62 CONNECTOR
64 CONNECTOR
65 CONNECTOR
66 CONNECTOR
67 CONNECTOR (PART OF CABLE ASSEMBLY)
85 CONTROL UNIT
92 COUPLING UNIT
45 DISCONNECT PLUG
202 DYNAMOTOR
236 AZIMUTH INDICATOR
250 STRAIN INSULATOR
285 LOOP
316 RADIO RECEIVER
354 RELAY
366 RESISTOR
369 RESISTOR
464 TEE
492 CONNECTOR

Figure 12–155. Direction finder set AN/ARN-59 (model CH-34C serial No. 57 1742 and subsequent)



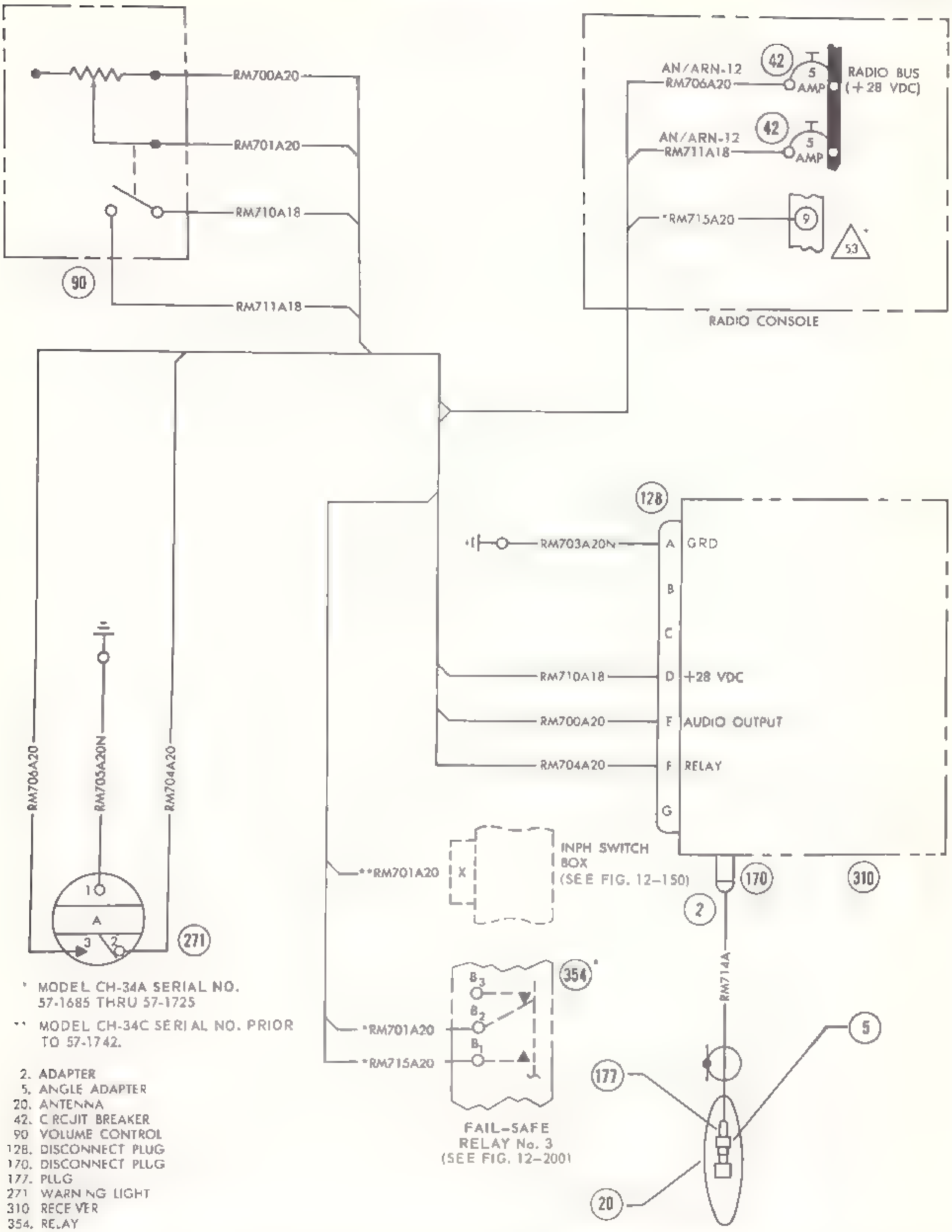
2. ANGLE ADAPTER
5. ANGLE ADAPTER
20. MARKER BEACON ANTENNA
42. CIRCUIT BREAKER
90. VOLUME CONTROL
128. DISCONNECT PLUG
170. DISCONNECT PLUG
77 PLUG
271. WARNING LIGHT
310. RECEIVER

Figure 12–156. Radio receiving set AN/ARN-12 (model CH-34A serial No. 54-882 through 55-4504)



2. ADAPTER
5. ANGLE ADAPTER
20. ANTENNA
42. CIRCUIT BREAKER
90. VOLUME CONTROL
128. DISCONNECT PLUG
170. DISCONNECT PLUG
177. PLUG
271. WARNING LIGHT
310. RECEIVER

Figure 12—157. Radio receiving set AN/ARN-12 (model No. 56-4284 through 56-4314, 56-4317 through 56-4319, and 56-4321 through 56-4342)

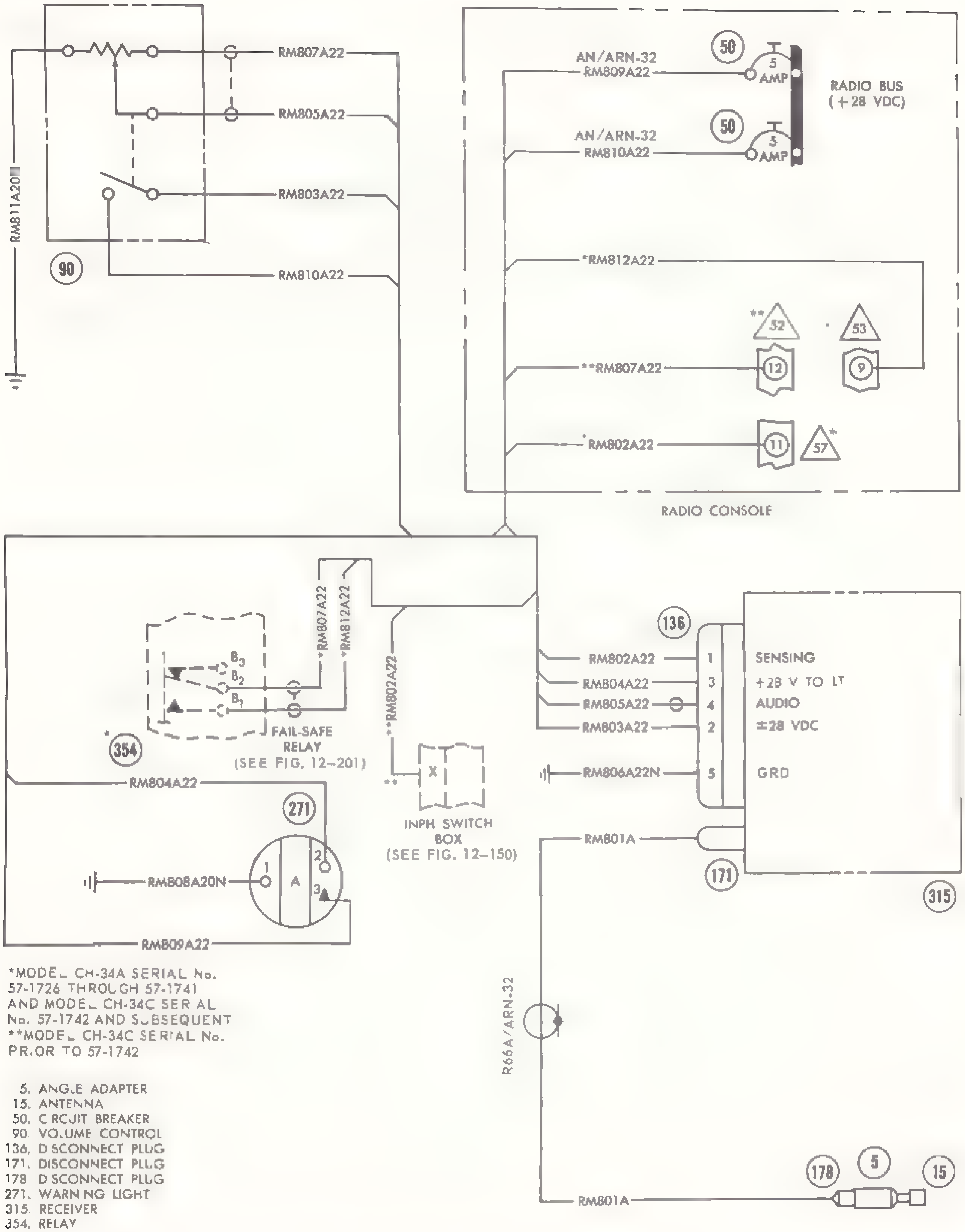


* MODEL CH-34A SERIAL NO. 57-1685 THRU 57-1725

** MODEL CH-34C SERIAL NO. PRIOR TO 57-1742.

2. ADAPTER
5. ANGLE ADAPTER
20. ANTENNA
42. CIRCUIT BREAKER
90. VOLUME CONTROL
128. DISCONNECT PLUG
170. DISCONNECT PLUG
177. PLUG
271. WARNING LIGHT
310. RECEIVER
354. RELAY

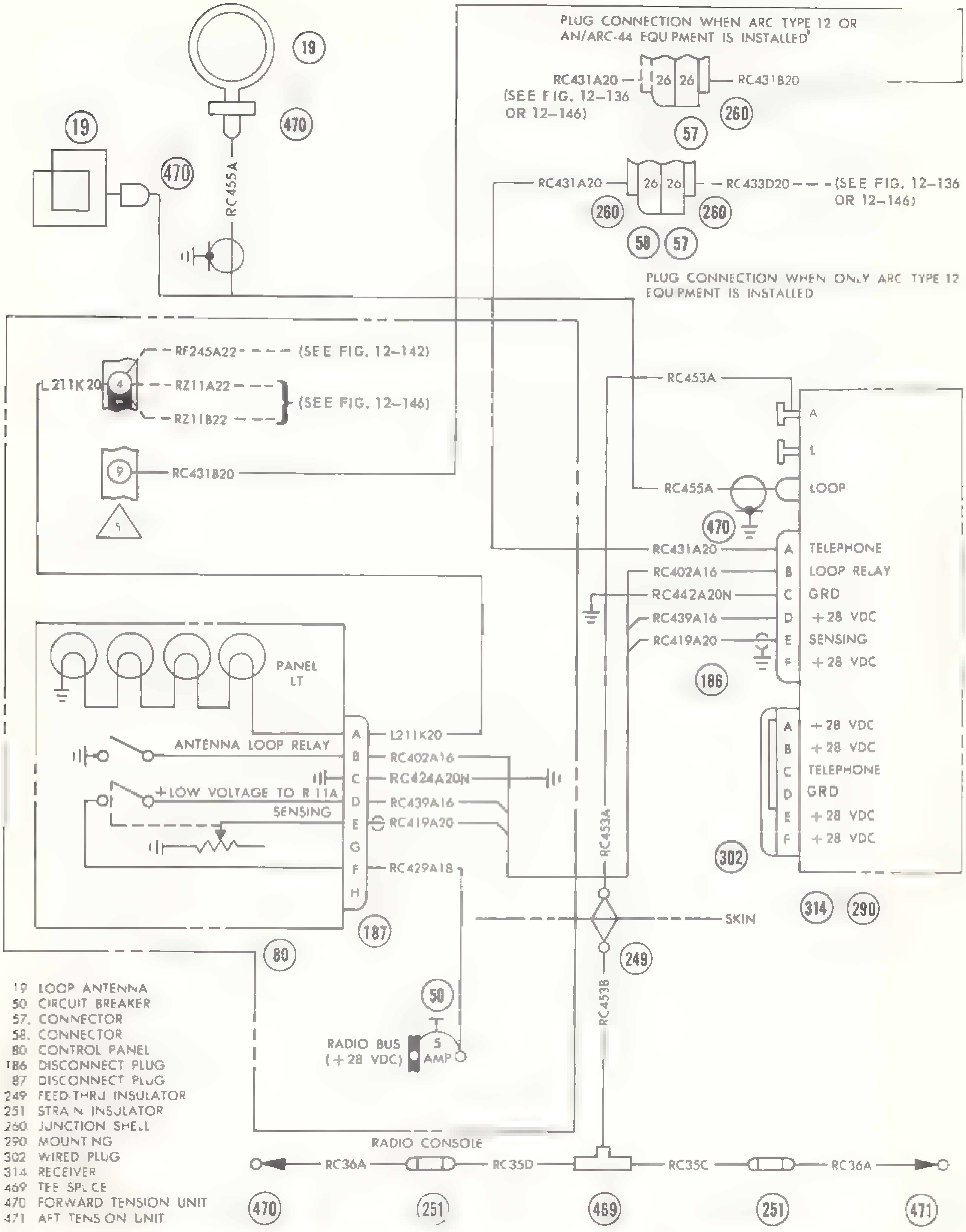
Figure 12–158. Radio receiving set AN/ARN-12 (model CH-34A serial No. 57-1685 through 57–1725, and model CH-34C serial No. prior to 57 1742)



*MODEL CH-34A SERIAL No. 57-1726 THROUGH 57-1741 AND MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT
**MODEL CH-34C SERIAL No. PRIOR TO 57-1742

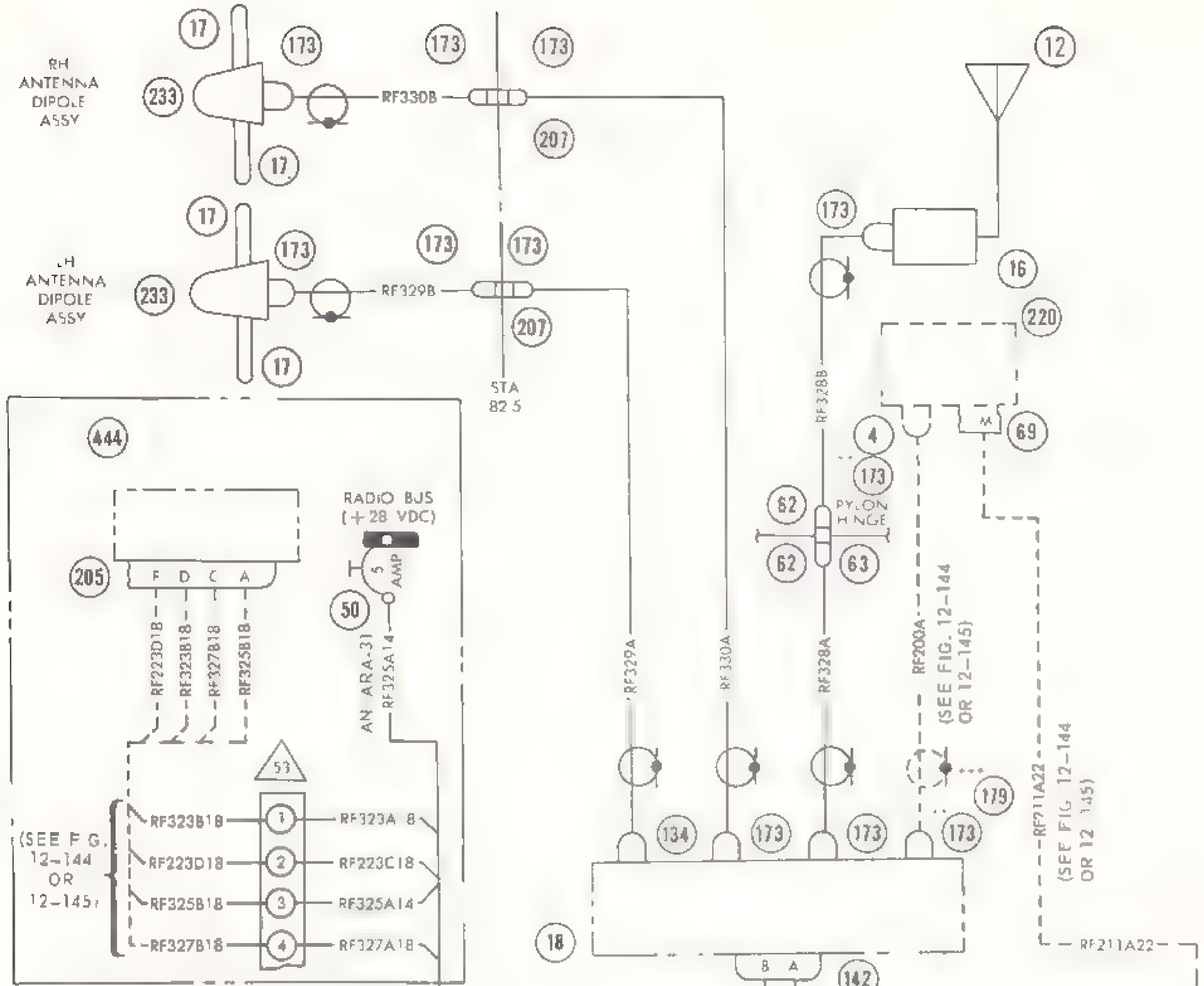
5. ANGLE ADAPTER
15. ANTENNA
50. CIRCUIT BREAKER
90. VOLUME CONTROL
136. DISCONNECT PLUG
171. DISCONNECT PLUG
178. DISCONNECT PLUG
271. WARNING LIGHT
315. RECEIVER
354. RELAY

Figure 12–159 Radio receiving set AN/ARN-32 (model CH-34A serial No. 57-1726 through 57-1741 and model CH-34C)



19. LOOP ANTENNA
50. CIRCUIT BREAKER
57. CONNECTOR
58. CONNECTOR
80. CONTROL PANEL
186. DISCONNECT PLUG
187. DISCONNECT PLUG
249. FEED-THRU INSULATOR
251. STRAIN INSULATOR
260. JUNCTION SHELL
290. MOUNTING
302. WIRED PLUG
314. RECEIVER
469. TEE SPLICE
470. FORWARD TENSION UNIT
471. AFT TENSION UNIT

Figure 12–160. LF range receiver (ARC type 12) (helicopters serial No. 54-882 through 54-3033)



*CABLES RF329A AND RF330A ARE TO BE WITHIN 1/2 INCH OF SAME LENGTH

**MODEL CH-34A SERIAL No. 57-1685 THROUGH 57-1741 AND MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT

***MODEL CH-34C PRIOR TO SERIAL No. 57-1742.

4. ANGLE ADAPTER
12. ANTENNA
16. ANTENNA COUPLER
17. ANTENNA ELEMENT
18. ANTENNA KEYING UNIT
50. CIRCUIT BREAKER
62. CONNECTOR
63. CONNECTOR
69. CONNECTOR ASSEMBLY
134. DISCONNECT PLUG
142. DISCONNECT PLUG
173. DISCONNECT PLUG
179. DISCONNECT PLUG
205. FEED-THRU
207. FEED THRU
220. FM RECEIVER TRANSMITTER
233. IMPEDANCE MATCHING NETWORK
444. SWITCH PANEL

Figure 12–161. Antenna group AN/ARA-31 (model CH-34A serial No. 57-1685 through 57-1741 and model CH-34C)

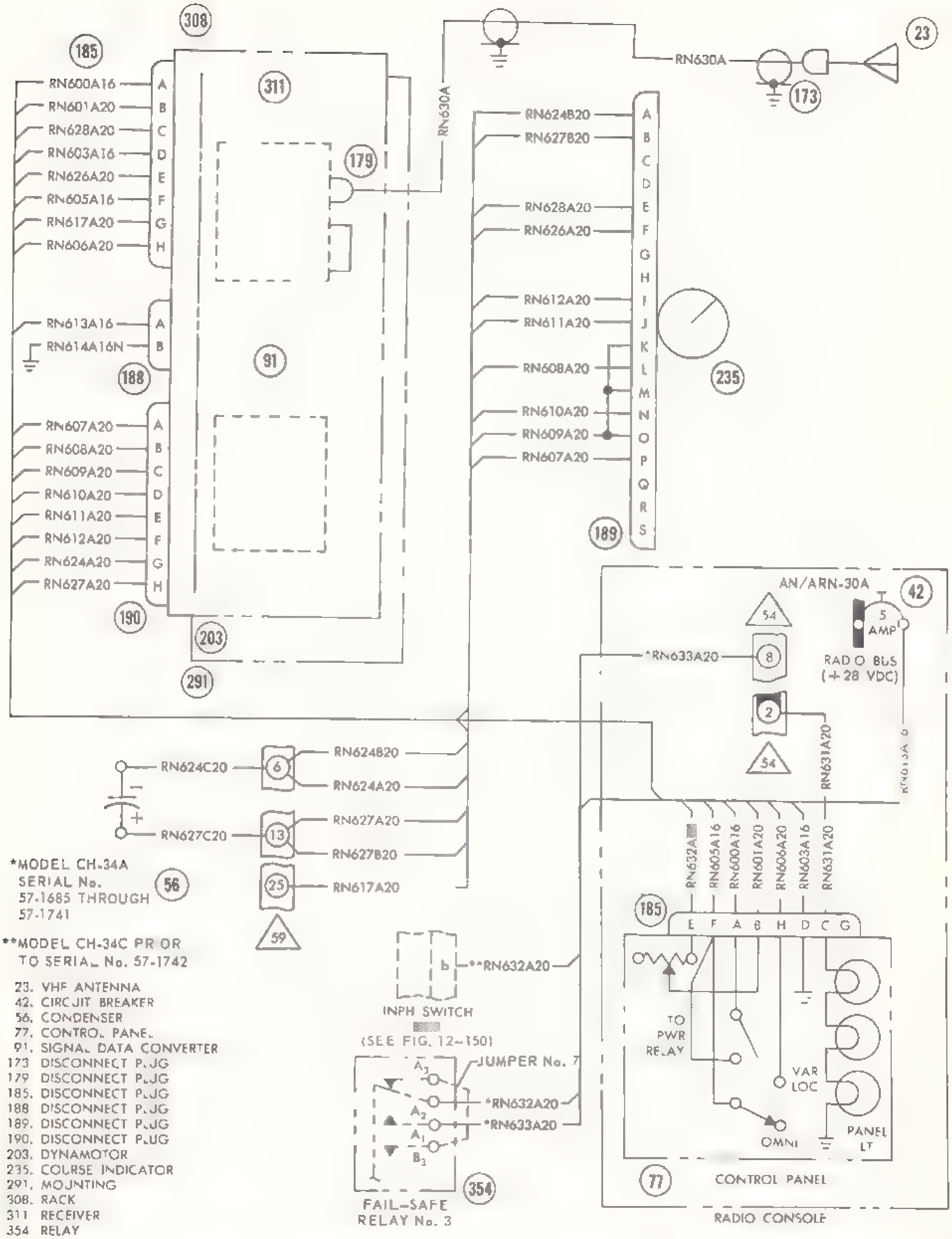
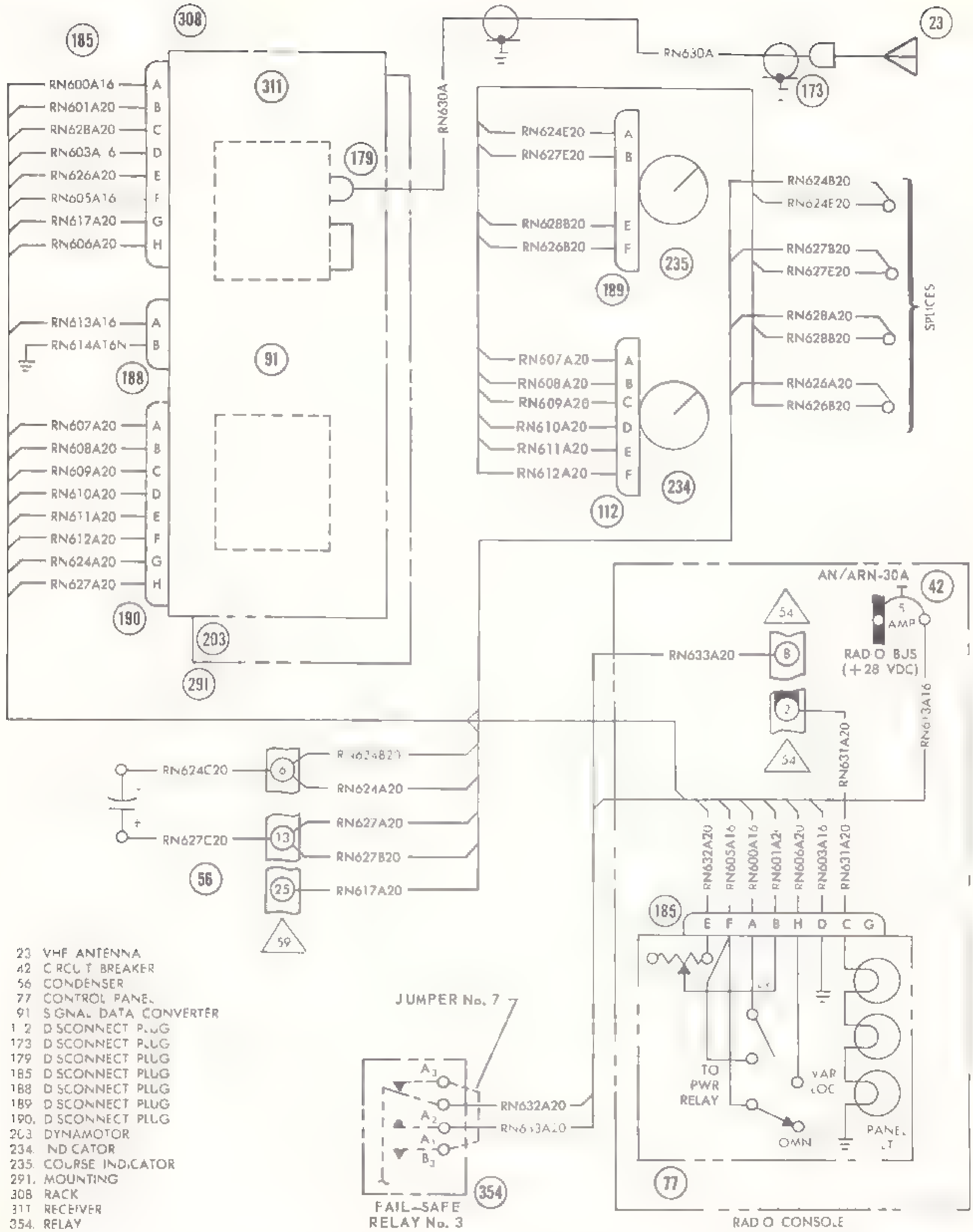


Figure 12–162. Radio receiving set AN/ARN-30A (model CH-34A serial No. 57-1685 through 57-1741 and model CH-34C serial No. prior to 57-1742)



23 VHF ANTENNA
42 CIRCUIT BREAKER
56 CONDENSER
77 CONTROL PANEL
91 SIGNAL DATA CONVERTER
112 DISCONNECT PLUG
173 DISCONNECT PLUG
179 DISCONNECT PLUG
185 DISCONNECT PLUG
188 DISCONNECT PLUG
189 DISCONNECT PLUG
190. DISCONNECT PLUG
203 DYNAMOTOR
234. INDICATOR
235. COURSE INDICATOR
291. MOUNTING
308 RACK
311 RECEIVER
354. RELAY

Figure 12–163. Radio receiving set AN/ARN-30A (model CH 34C serial No. 57-1742 and subsequent)

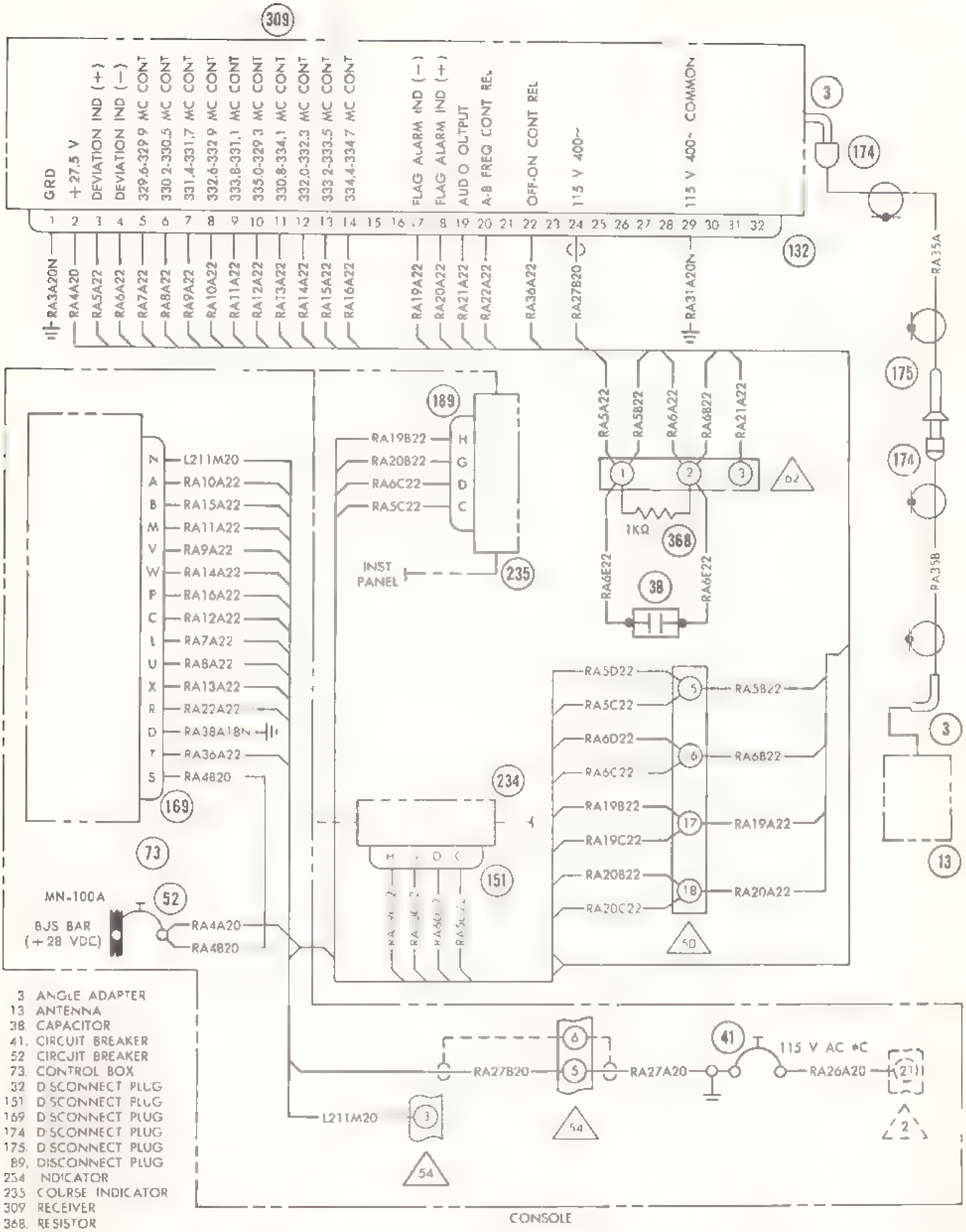
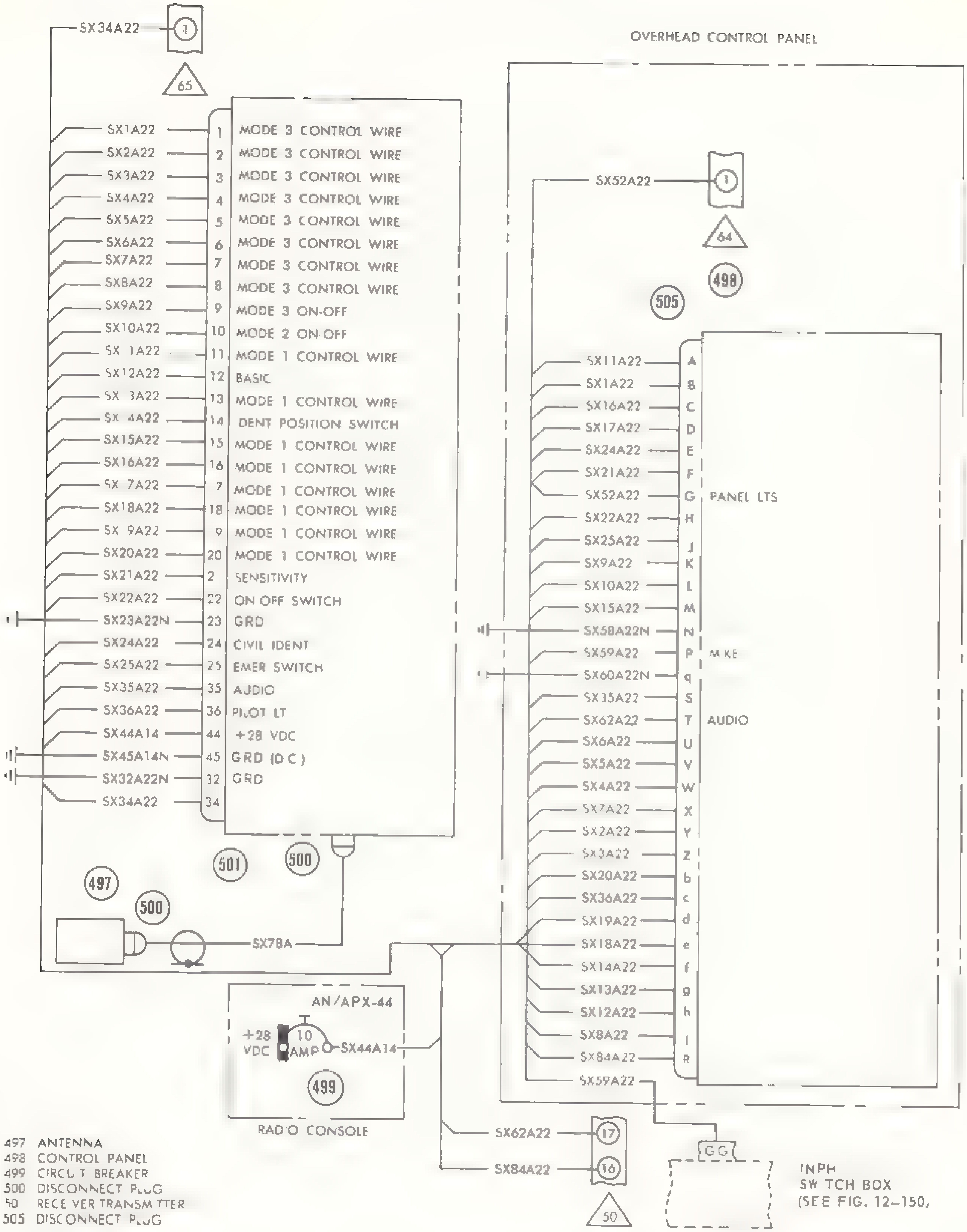
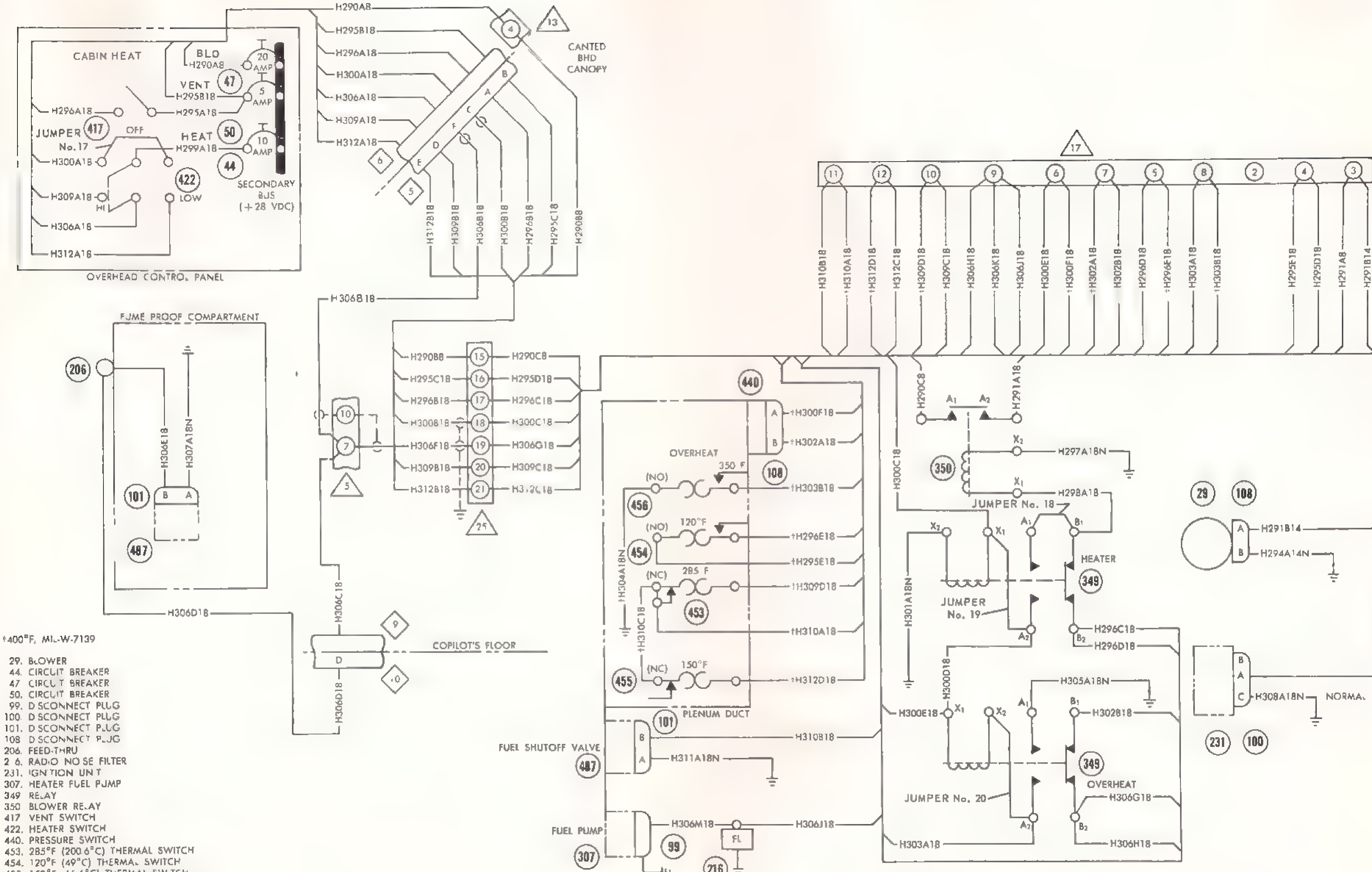


Figure 12–164. Glide slope receiver MN-100A (model CH-34C serial No. 57-1742 and subsequent)



497 ANTENNA
498 CONTROL PANEL
499 CIRCUIT BREAKER
500 DISCONNECT PLUG
50 RECEIVER TRANSMITTER
505 DISCONNECT PLUG

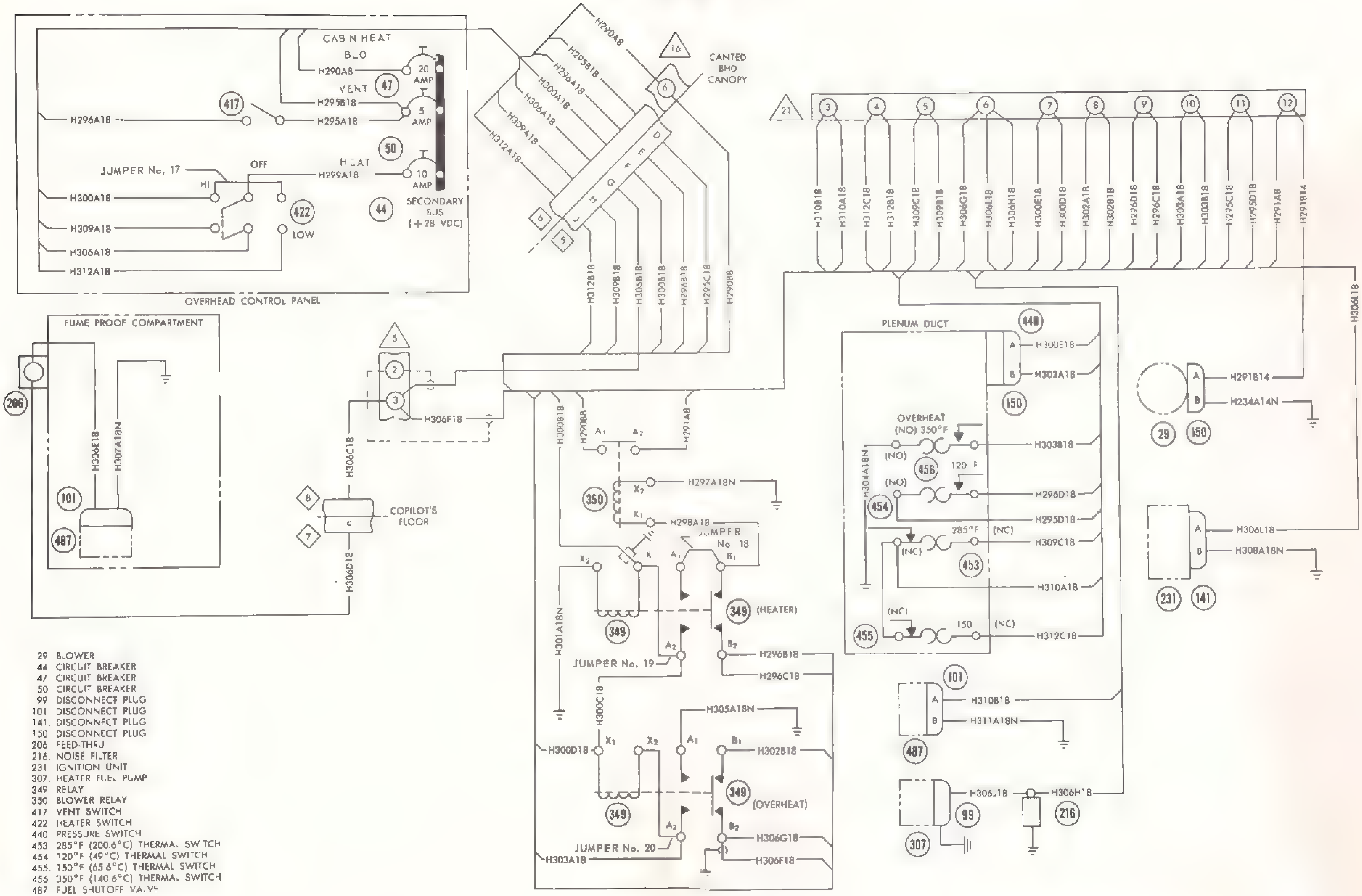
Figure 12—165. Radar identification set AN/APX 44 (model CH 34C serial No. prior to 57-1742)



†400°F, MIL-W-7139

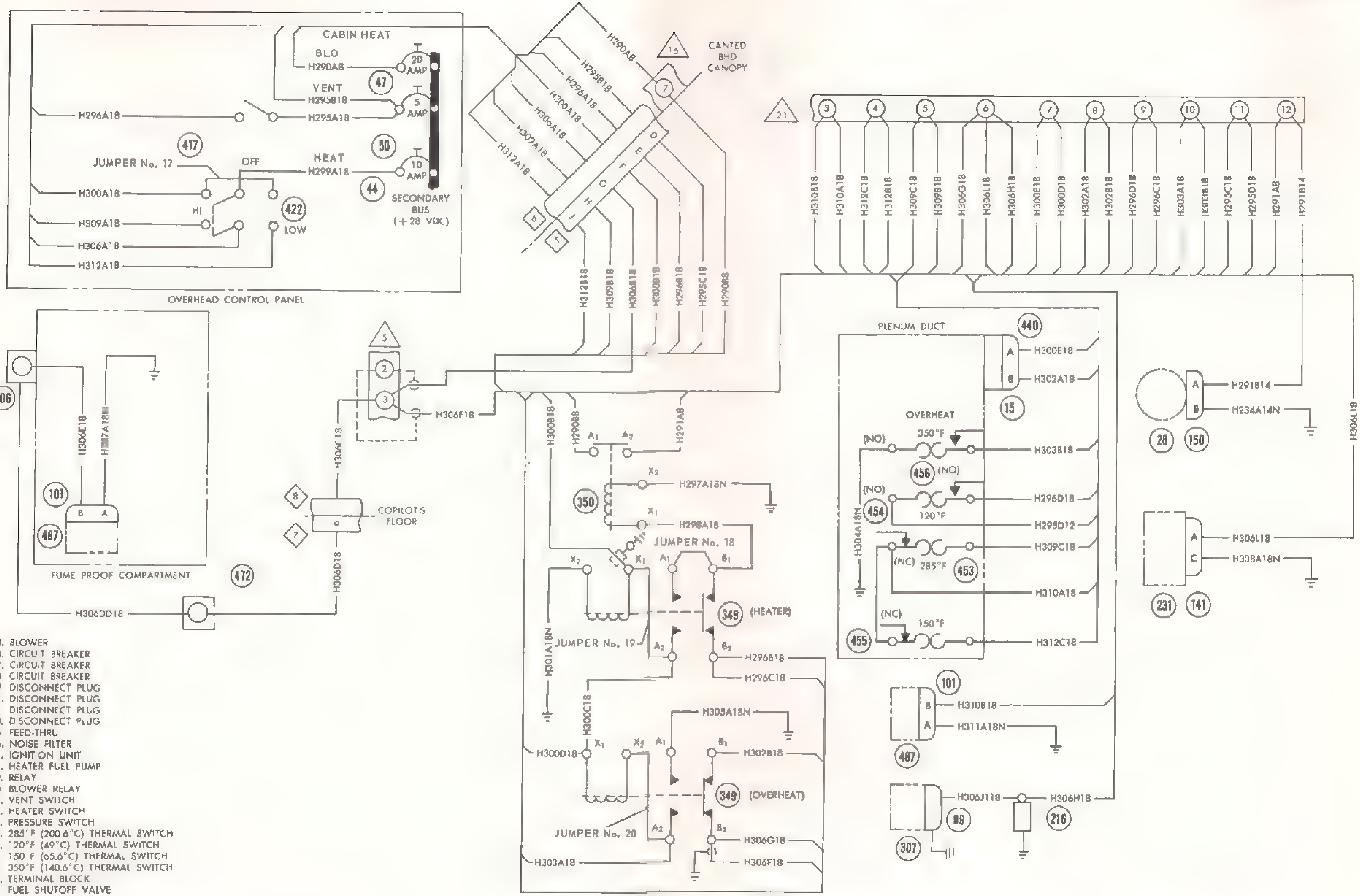
29. BLOWER
44. CIRCUIT BREAKER
47. CIRCUIT BREAKER
50. CIRCUIT BREAKER
99. DISCONNECT PLUG
100. DISCONNECT PLUG
101. DISCONNECT PLUG
108. DISCONNECT PLUG
206. FEED-THRU
216. RADIO NOISE FILTER
231. IGNITION UNIT
307. HEATER FUEL PUMP
349. RELAY
350. BLOWER RELAY
417. VENT SWITCH
422. HEATER SWITCH
440. PRESSURE SWITCH
453. 285°F (200.6°C) THERMAL SWITCH
454. 120°F (49°C) THERMAL SWITCH
455. 150°F (65.6°C) THERMAL SWITCH
456. 350° (140.6°C) THERMAL SWITCH
487. FUEL SHUTOFF VALVE

Figure 12–166. Cabin heater (model CH-34A serial No. prior to 56-4313)



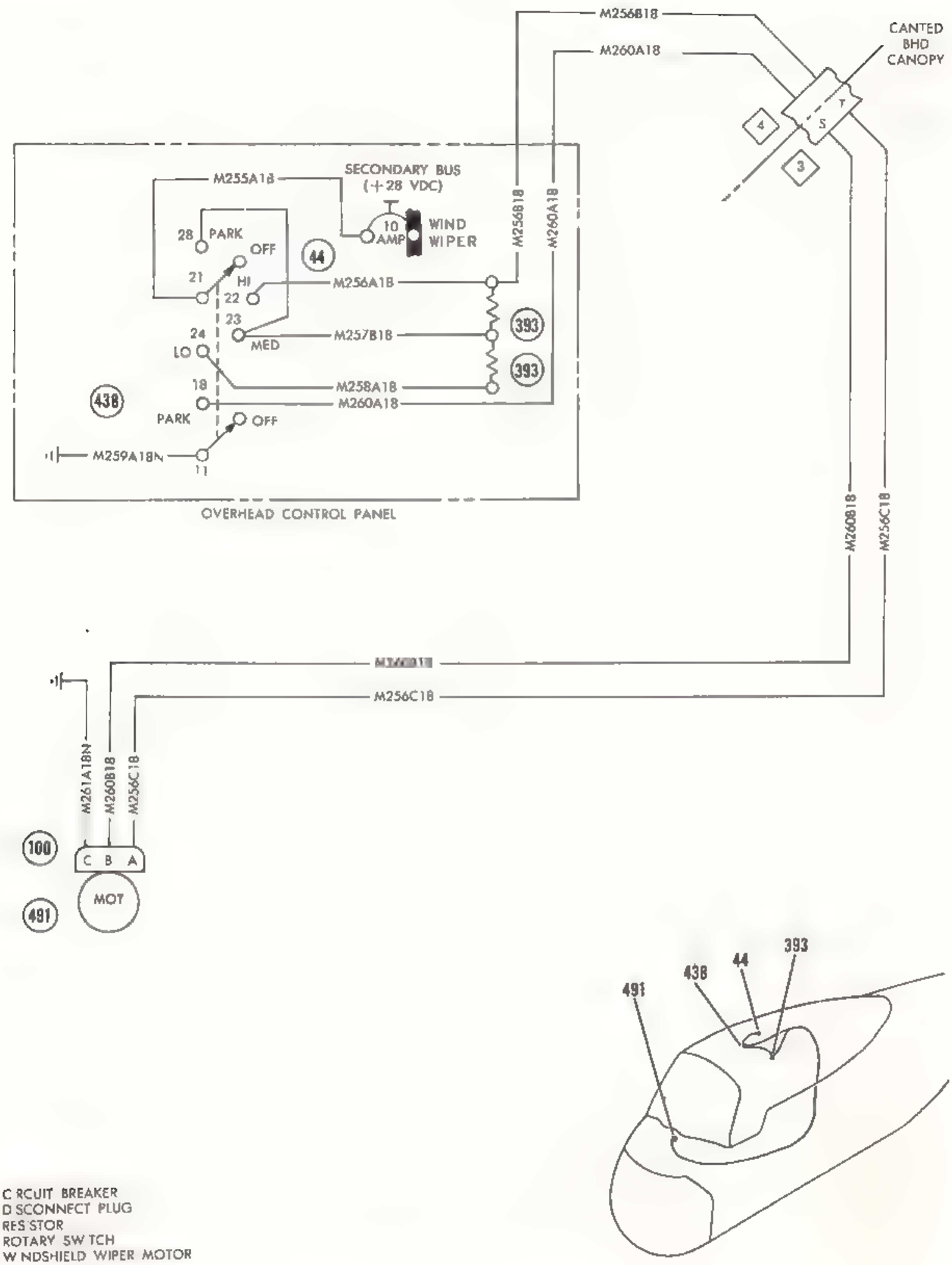
29 BLOWER
44 CIRCUIT BREAKER
47 CIRCUIT BREAKER
50 CIRCUIT BREAKER
99 DISCONNECT PLUG
101 DISCONNECT PLUG
141 DISCONNECT PLUG
150 DISCONNECT PLUG
206 FEED-THRU
216 NOISE FILTER
231 IGNITION UNIT
307 HEATER FUEL PUMP
349 RELAY
350 BLOWER RELAY
417 VENT SWITCH
422 HEATER SWITCH
440 PRESSURE SWITCH
453 285°F (200.6°C) THERMAL SWITCH
454 120°F (49°C) THERMAL SWITCH
455 150°F (65.6°C) THERMAL SWITCH
456 350°F (140.6°C) THERMAL SWITCH
487 FUEL SHUTOFF VALVE

Figure 12–167. Cabin heater (model CH-34A serial No. 56-4313 through 57-1702)



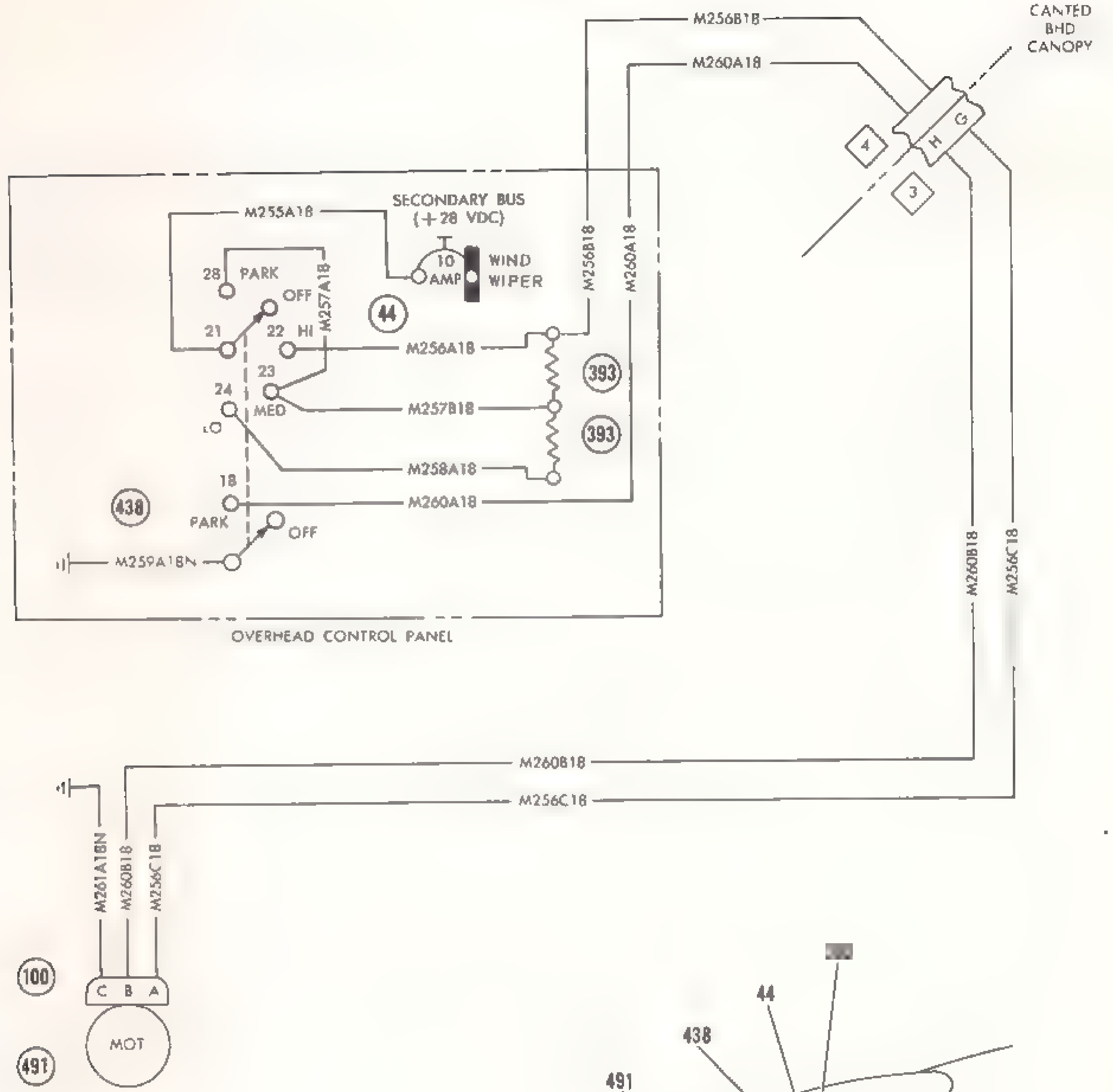
28. BLOWER
44. CIRCUIT BREAKER
47. CIRCUIT BREAKER
50. CIRCUIT BREAKER
99. DISCONNECT PLUG
101. DISCONNECT PLUG
141. DISCONNECT PLUG
150. DISCONNECT PLUG
206. FEED-THRU
216. NOISE FILTER
231. IGNITION UNIT
307. HEATER FUEL PUMP
349. RELAY
350. BLOWER RELAY
417. VENT SWITCH
422. HEATER SWITCH
440. PRESSURE SWITCH
453. 285°F (200.6°C) THERMAL SWITCH
454. 120°F (49°C) THERMAL SWITCH
455. 150 F (65.6°C) THERMAL SWITCH
456. 350°F (140.6°C) THERMAL SWITCH
472. TERMINAL BLOCK
487. FUEL SHUTOFF VALVE

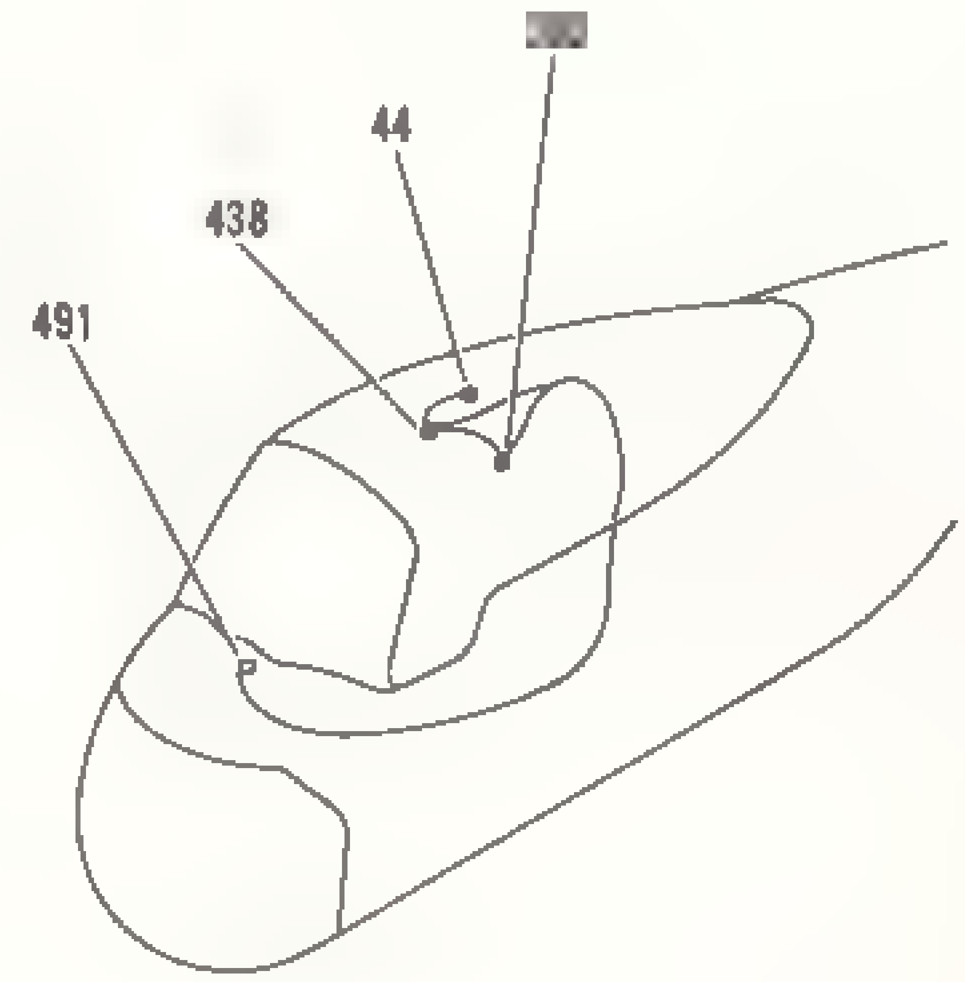
Figure 12–168. Cabin heater (model CH-34A serial No. 57-1703 through 57-1741 and model CH-34C)



44. CIRCUIT BREAKER
100. DISCONNECT PLUG
393. RESISTOR
438 ROTARY SWITCH
491 WINDSHIELD WIPER MOTOR

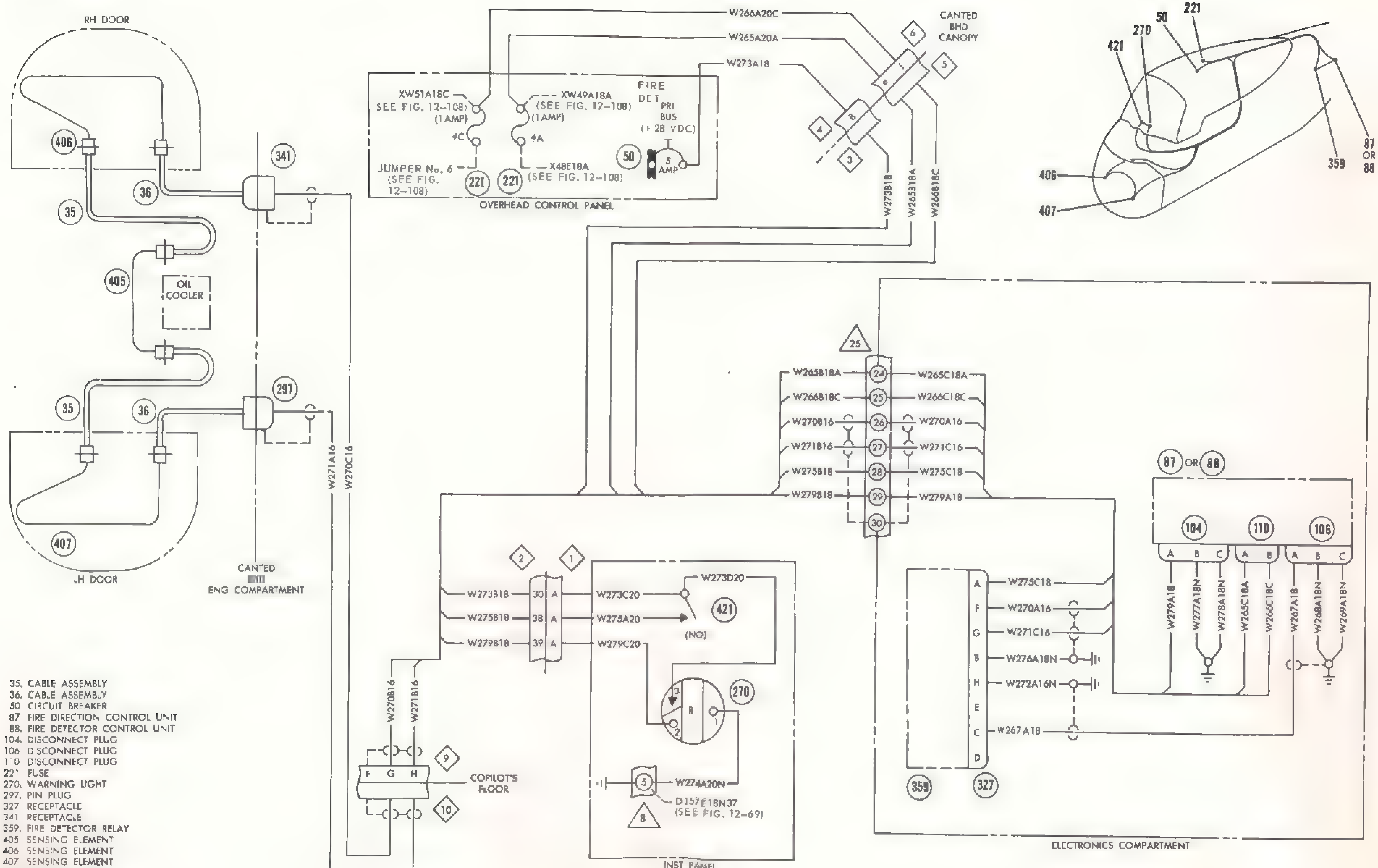
Figure 12–169. Windshield wiper (model CH-34A serial No. prior to 56-4313)





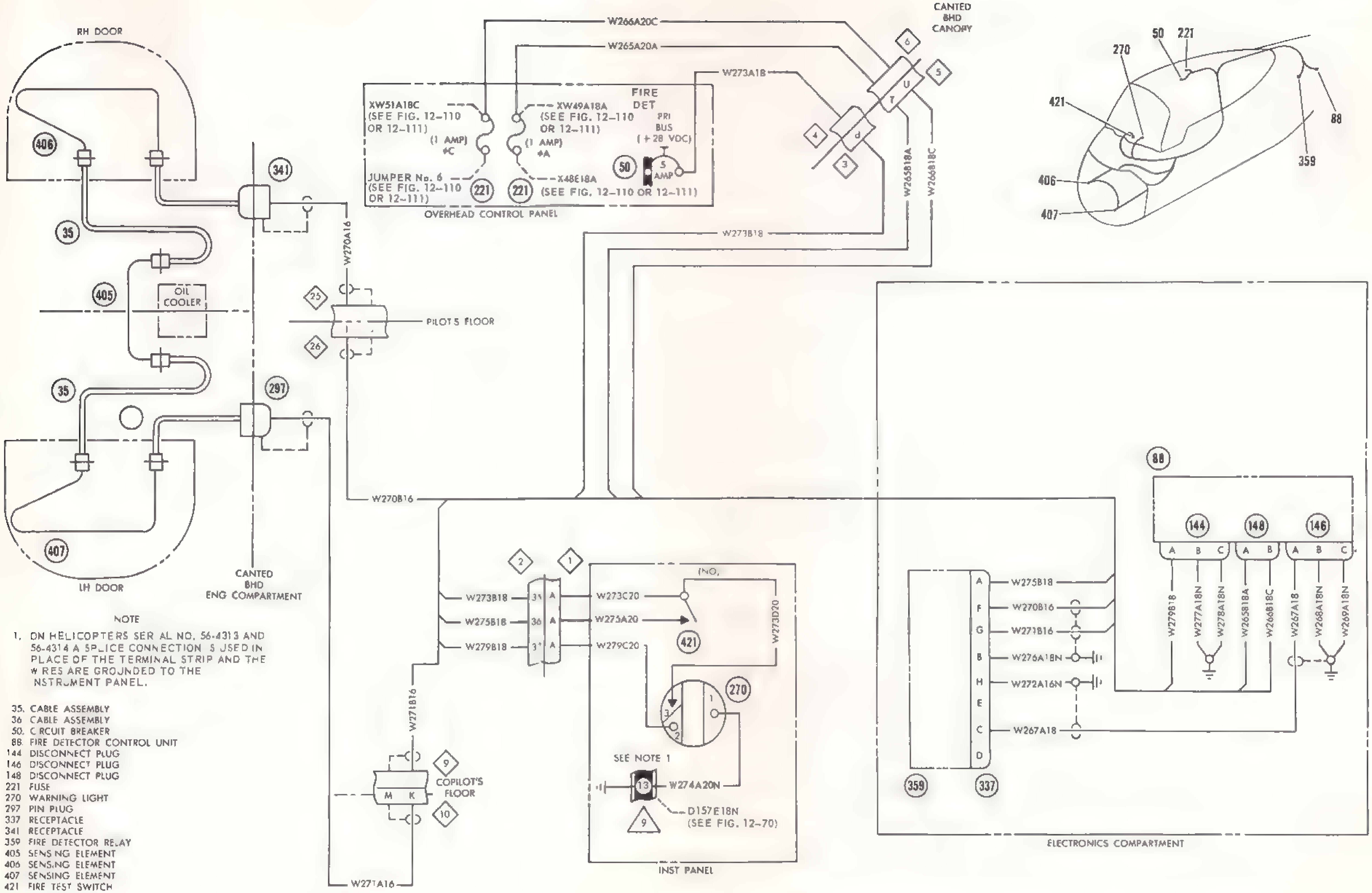
44. CIRCUIT BREAKER
100. DISCONNECT PLUG
393. RESISTOR
438. ROTARY SWITCH
491. WINDSHIELD WIPER MOTOR

Figure 12–170. Windshield wiper (model CH 34A serial No. 56-4313 through 57-1741 and model CH-34C)



35. CABLE ASSEMBLY
36. CABLE ASSEMBLY
50 CIRCUIT BREAKER
87 FIRE DIRECTION CONTROL UNIT
88. FIRE DETECTOR CONTROL UNIT
104. DISCONNECT PLUG
106 DISCONNECT PLUG
110 DISCONNECT PLUG
221 FUSE
270. WARNING LIGHT
297. PIN PLUG
327 RECEPTACLE
341 RECEPTACLE
359. FIRE DETECTOR RELAY
405 SENSING ELEMENT
406 SENSING ELEMENT
407 SENSING ELEMENT
421 FIRE TEST SWITCH

Figure 12–171. Fire detector (model CH-34A serial No. prior to 56-4313)

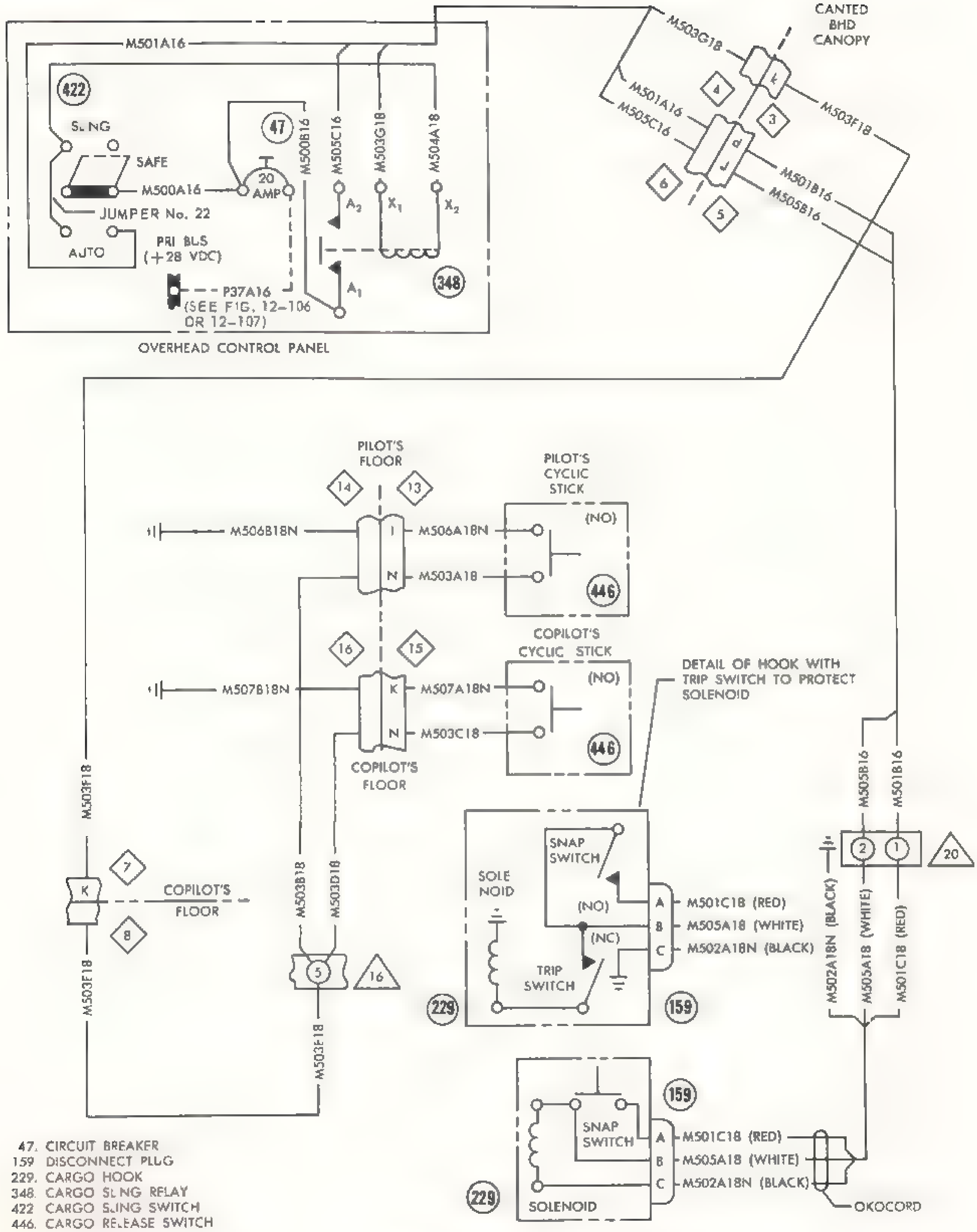


NOTE

1. ON HELICOPTERS SERIAL NO. 56-4313 AND 56-4314 A SPLICE CONNECTION IS USED IN PLACE OF THE TERMINAL STRIP AND THE WIRES ARE GROUNDED TO THE INSTRUMENT PANEL.

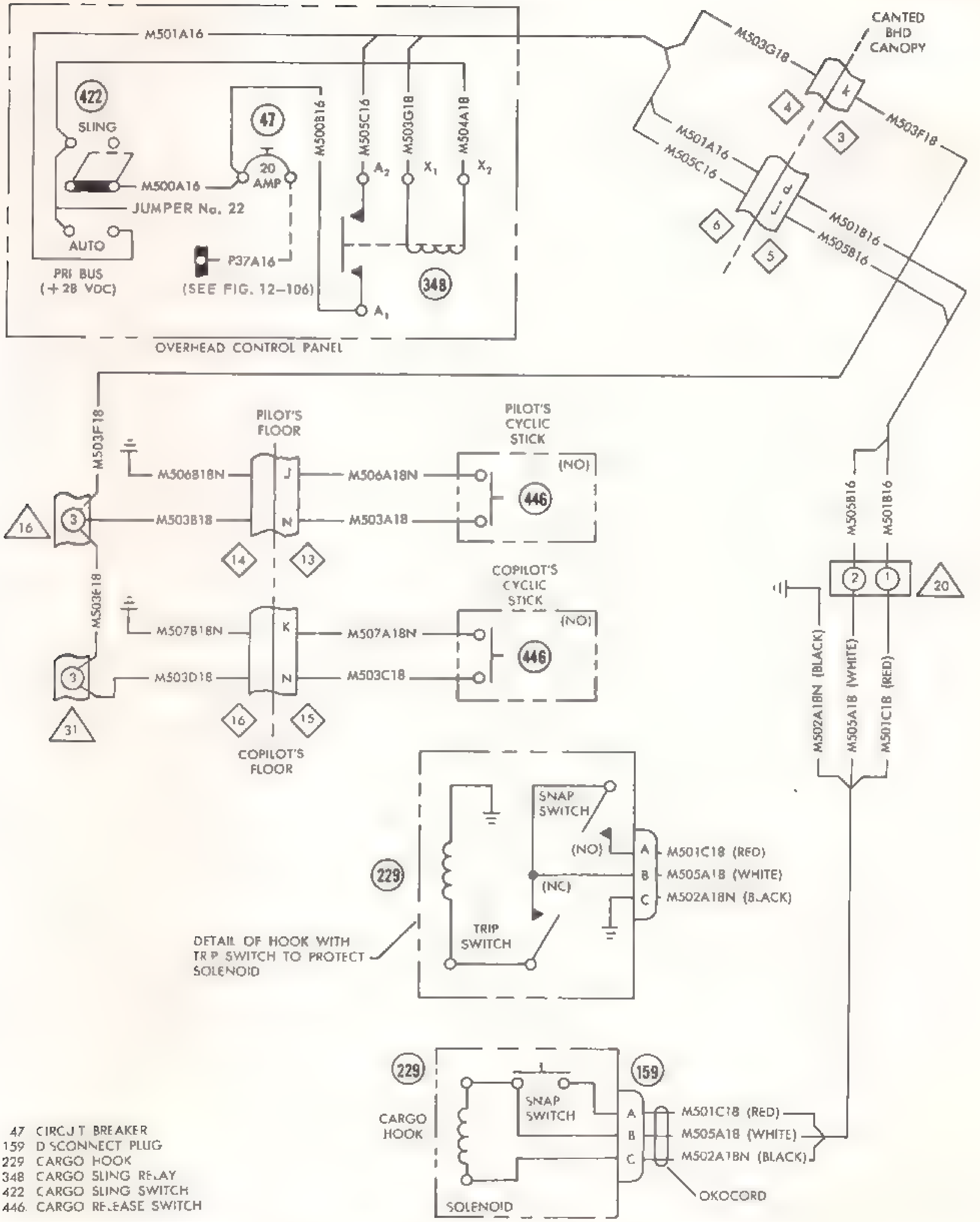
35. CABLE ASSEMBLY
36. CABLE ASSEMBLY
50. CIRCUIT BREAKER
88. FIRE DETECTOR CONTROL UNIT
144. DISCONNECT PLUG
146. DISCONNECT PLUG
148. DISCONNECT PLUG
221. FUSE
270. WARNING LIGHT
297. PIN PLUG
337. RECEPTACLE
341. RECEPTACLE
359. FIRE DETECTOR RELAY
405. SENSING ELEMENT
406. SENSING ELEMENT
407. SENSING ELEMENT
421. FIRE TEST SWITCH

Figure 12–172. Fire detector (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



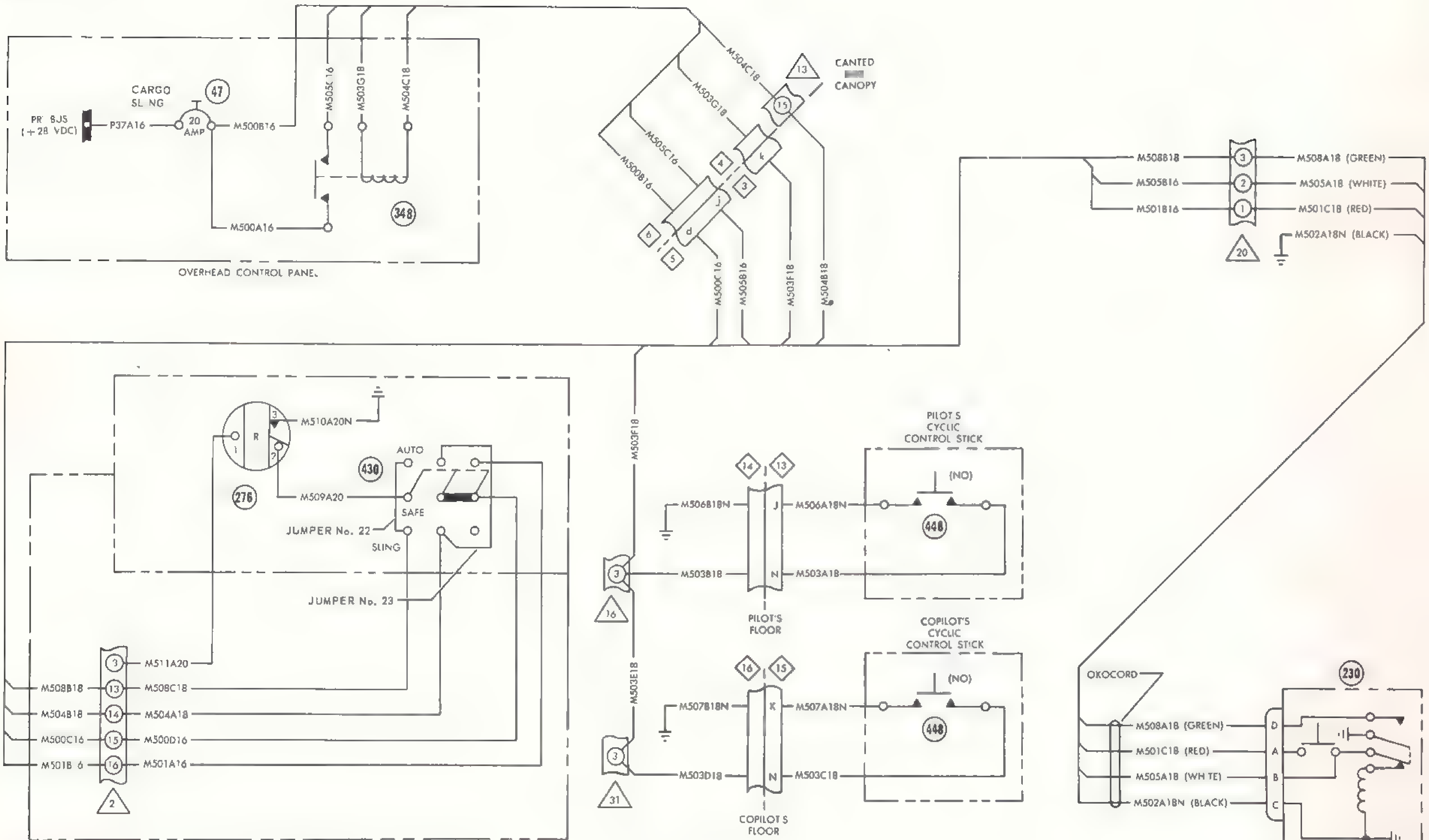
47. CIRCUIT BREAKER
159. DISCONNECT PLUG
229. CARGO HOOK
348. CARGO SLING RELAY
422. CARGO SLING SWITCH
446. CARGO RELEASE SWITCH

Figure 12–173. Cargo sling (model CH-34A serial No. prior to 55-4497)



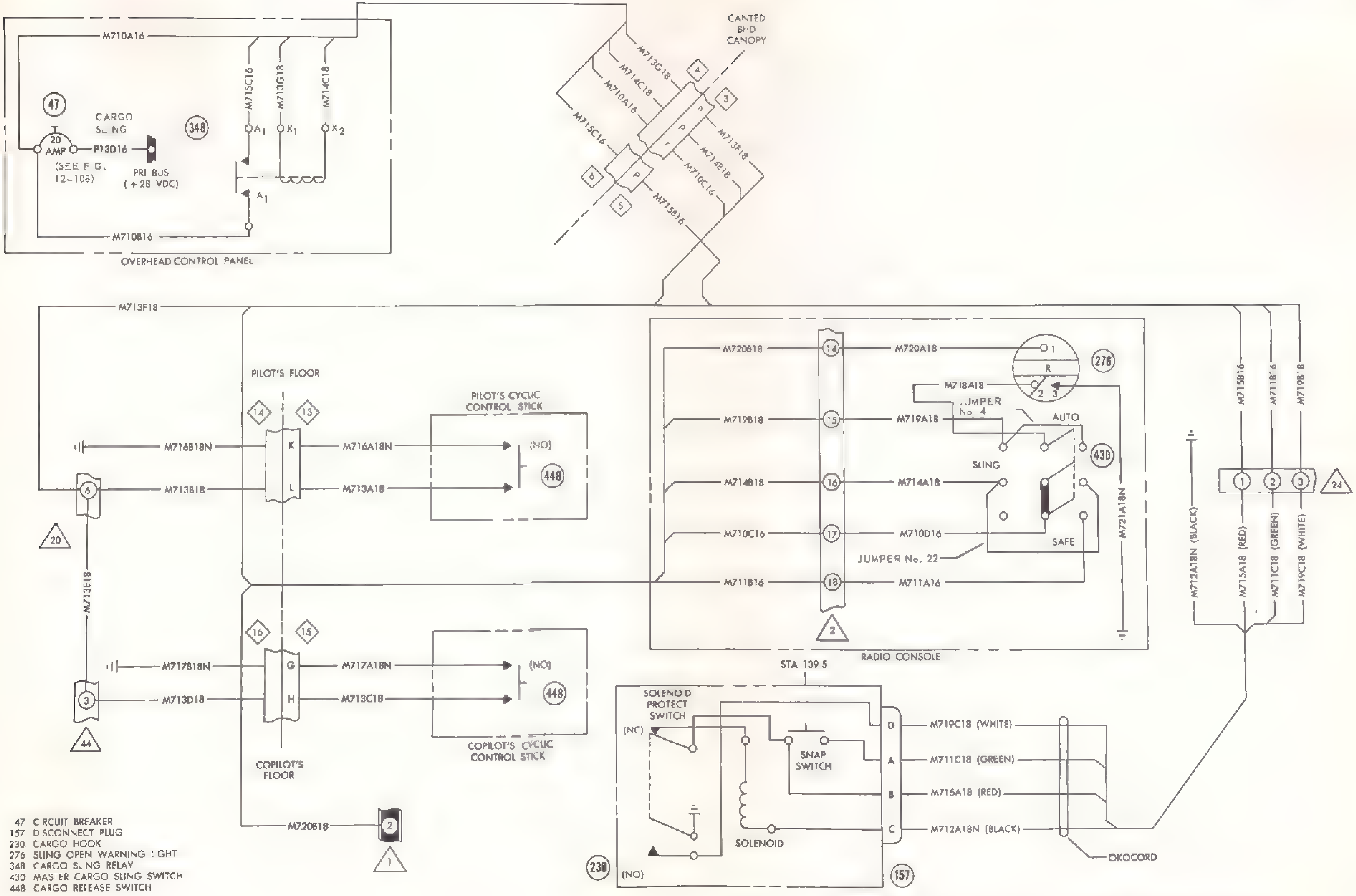
47 CIRCUIT BREAKER
159 DISCONNECT PLUG
229 CARGO HOOK
348 CARGO SLING RELAY
422 CARGO SLING SWITCH
446 CARGO RELEASE SWITCH

Figure 12–174. Cargo sling (model CH-34A serial No. 55-4497 through 55-4504)



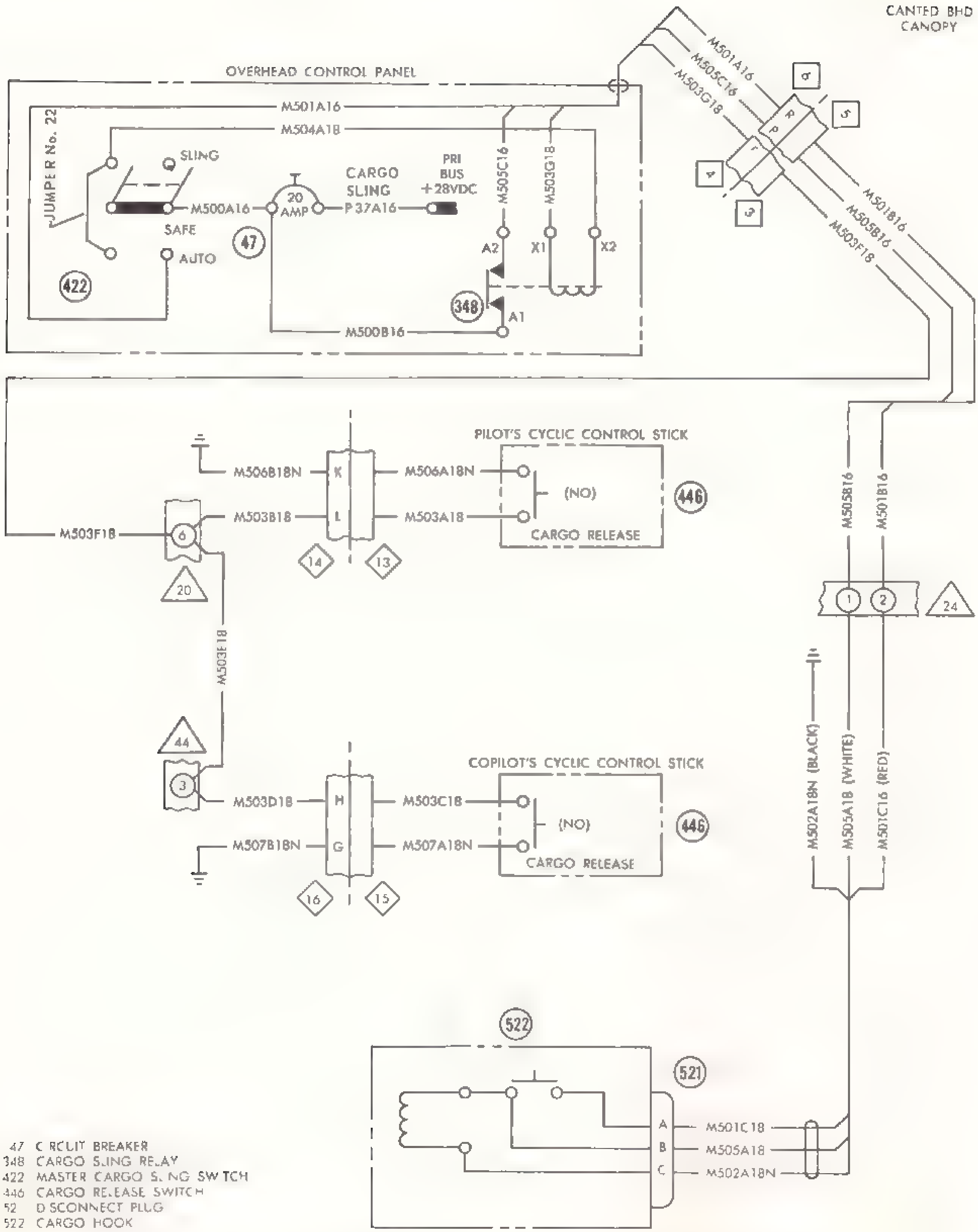
47. CIRCUIT BREAKER
157. DISCONNECT PLUG
230. CARGO HOOK
276. SLING OPEN WARNING LIGHT
348. CARGO SLING RELAY
430. CARGO SLING SWITCH
448. CARGO RELEASE SWITCH

Figure 12–175. Cargo sling (model CH 34A serial No. 56 4284 through 56-4312)



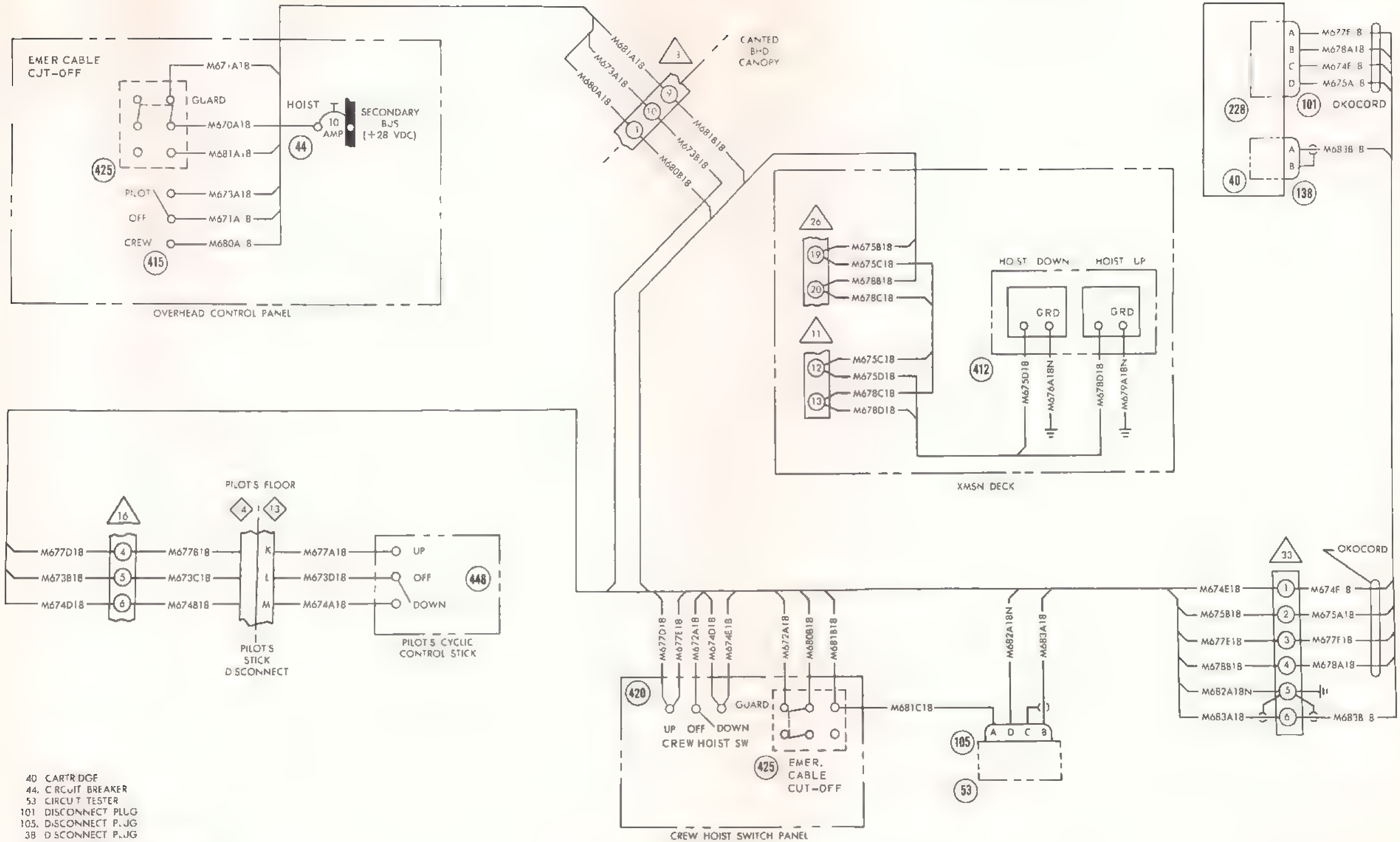
47 CIRCUIT BREAKER
157 DISCONNECT PLUG
230 CARGO HOOK
276 SLING OPEN WARNING LIGHT
348 CARGO SLING RELAY
430 MASTER CARGO SLING SWITCH
448 CARGO RELEASE SWITCH

Figure 12–176. Cargo sling (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C serial No. 57-1742 and subsequent)



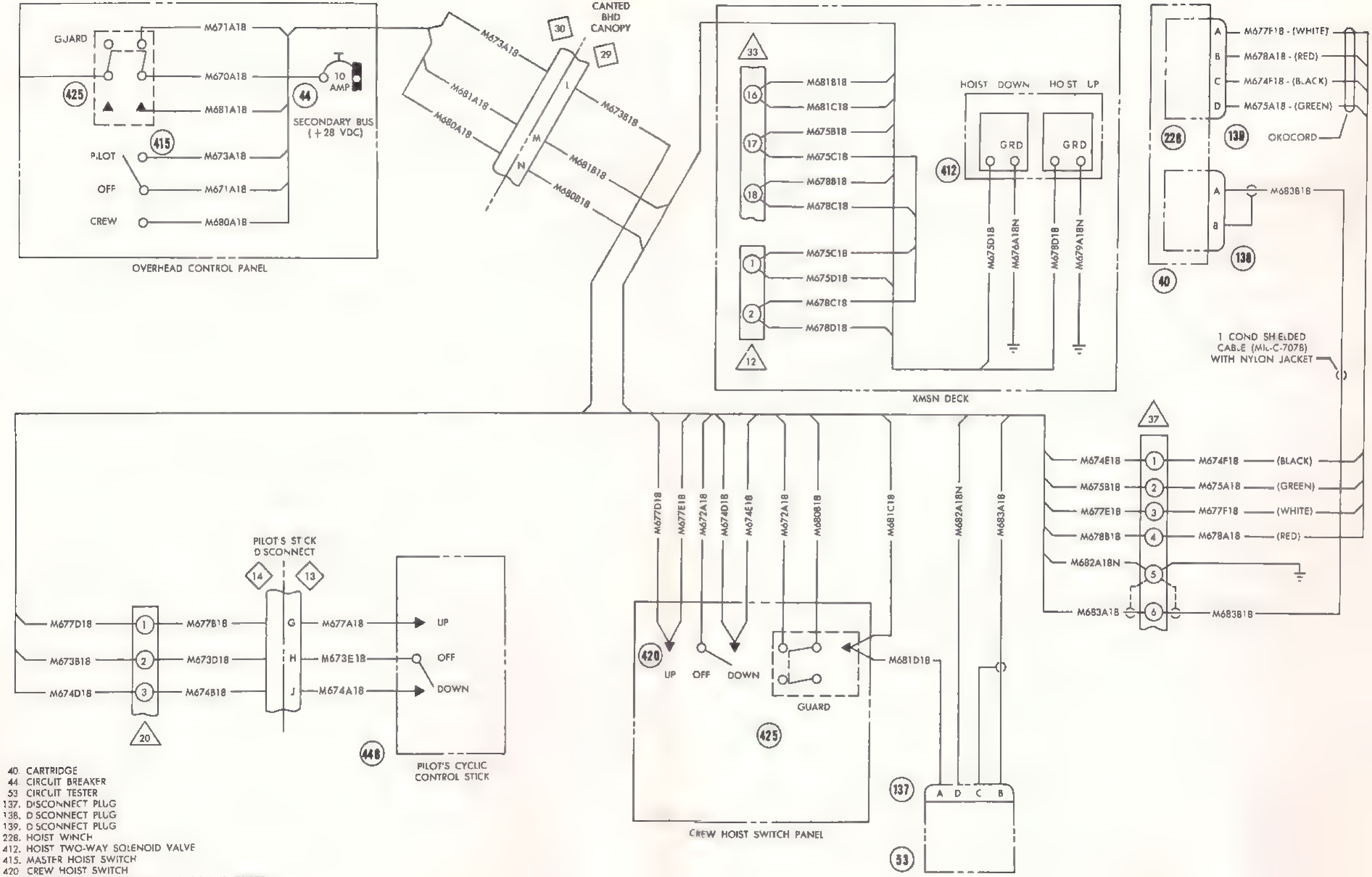
47 CIRCUIT BREAKER
348 CARGO SLING RELAY
422 MASTER CARGO SLING SWITCH
446 CARGO RELEASE SWITCH
52 DISCONNECT PLUG
522 CARGO HOOK

Figure 12—177. Cargo sling (model CH 34C serial No. prior to 57-1742)



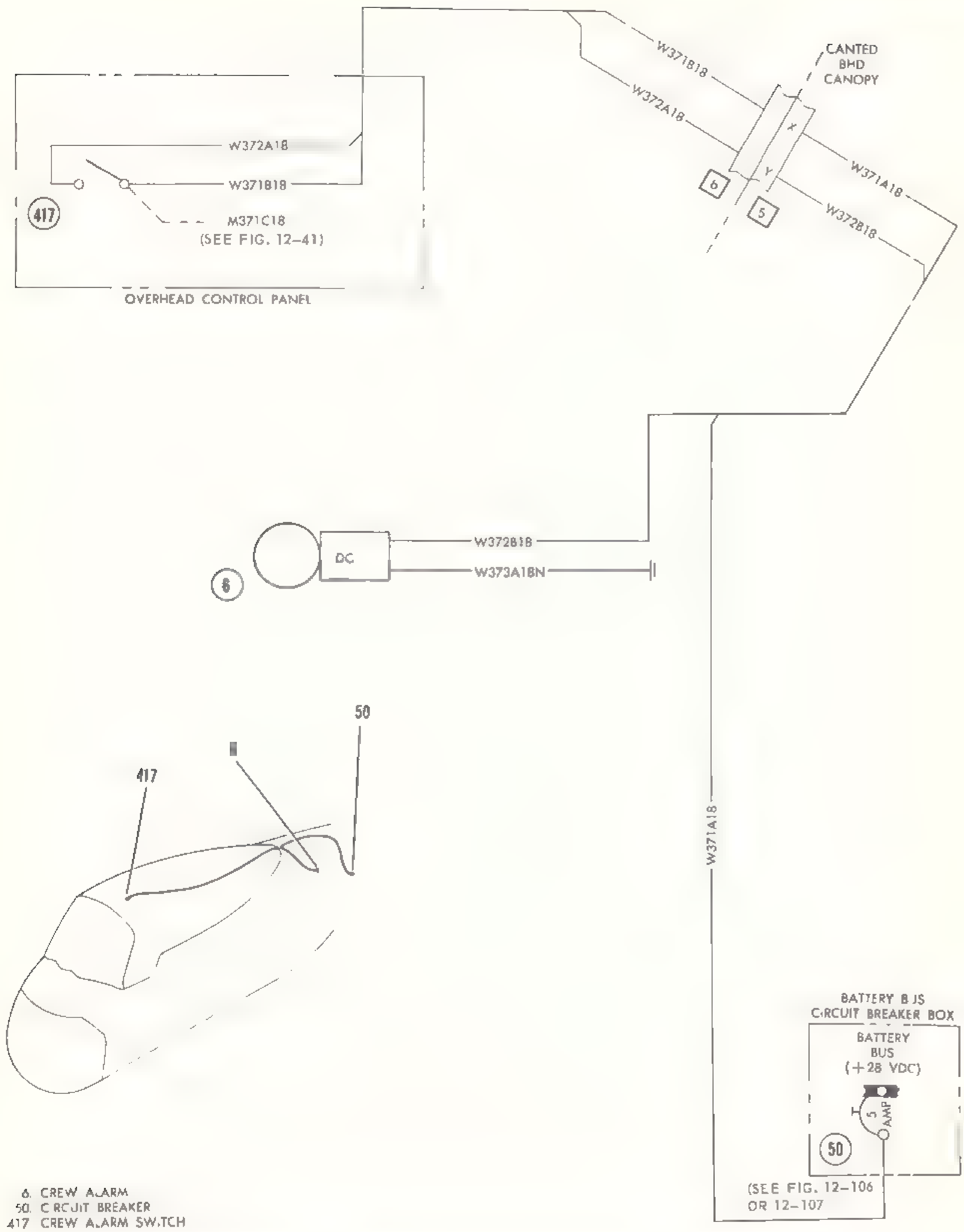
40. CARTRIDGE
44. CIRCUIT BREAKER
53. CIRCUIT TESTER
101. DISCONNECT PLUG
105. DISCONNECT PLUG
138. DISCONNECT PLUG
228. HOIST WINCH
412. HOIST TWO-WAY SOLENOID VALVE
415. MASTER HOIST SWITCH
420. CREW HOIST SWITCH
425. EMERGENCY CABLE CUT-OFF SWITCH AND GUARD
448. PILOTS HOIST SWITCH

Figure 12–178. Rescue hoist (model CH-34A serial No. prior to 56-4313)



40. CARTRIDGE
44. CIRCUIT BREAKER
53. CIRCUIT TESTER
137. DISCONNECT PLUG
138. DISCONNECT PLUG
139. DISCONNECT PLUG
228. HOIST WINCH
412. HOIST TWO-WAY SOLENOID VALVE
415. MASTER HOIST SWITCH
420. CREW HOIST SWITCH
425. EMERGENCY CABLE CUT OFF SWITCH AND GUARD
448. PILOT'S HOIST SWITCH

Figure 12–179. Rescue hoist (model CH-34A serial No. 56-4313 through 57-1741 and model CH-34C)



6. CREW ALARM
50. CIRCUIT BREAKER
417 CREW ALARM SWITCH

Figure 12–180. Crew alarm bell (model CH-34A serial No. prior to 56-4313)

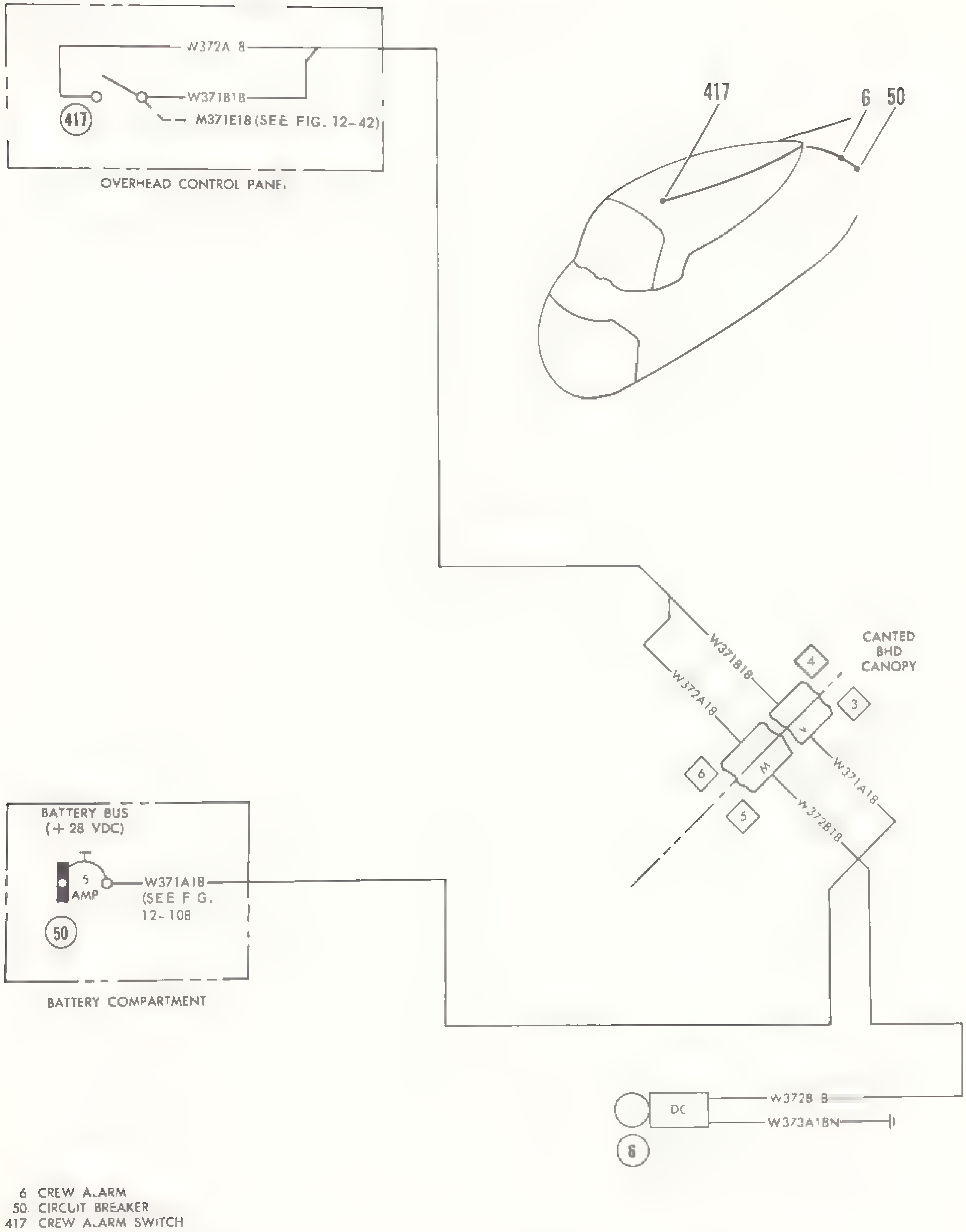
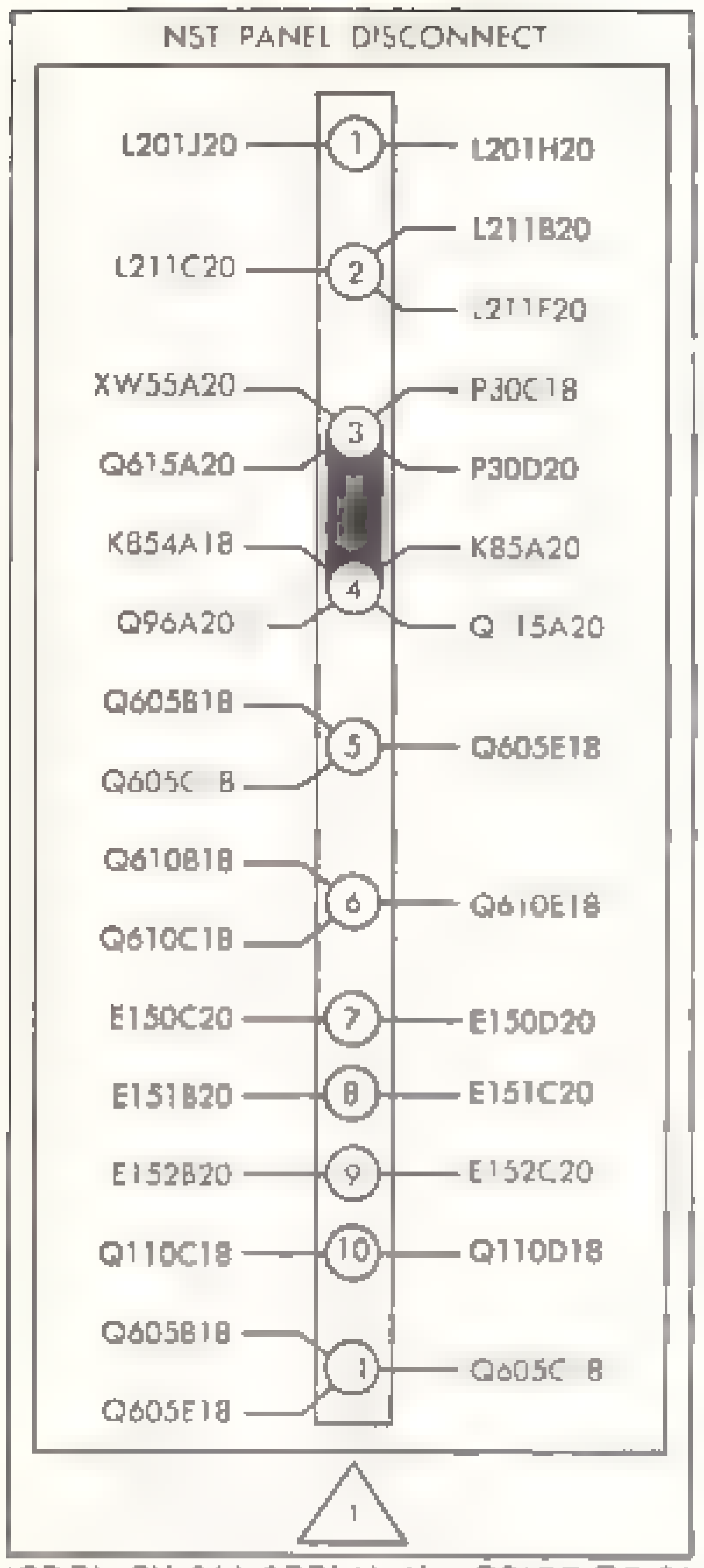
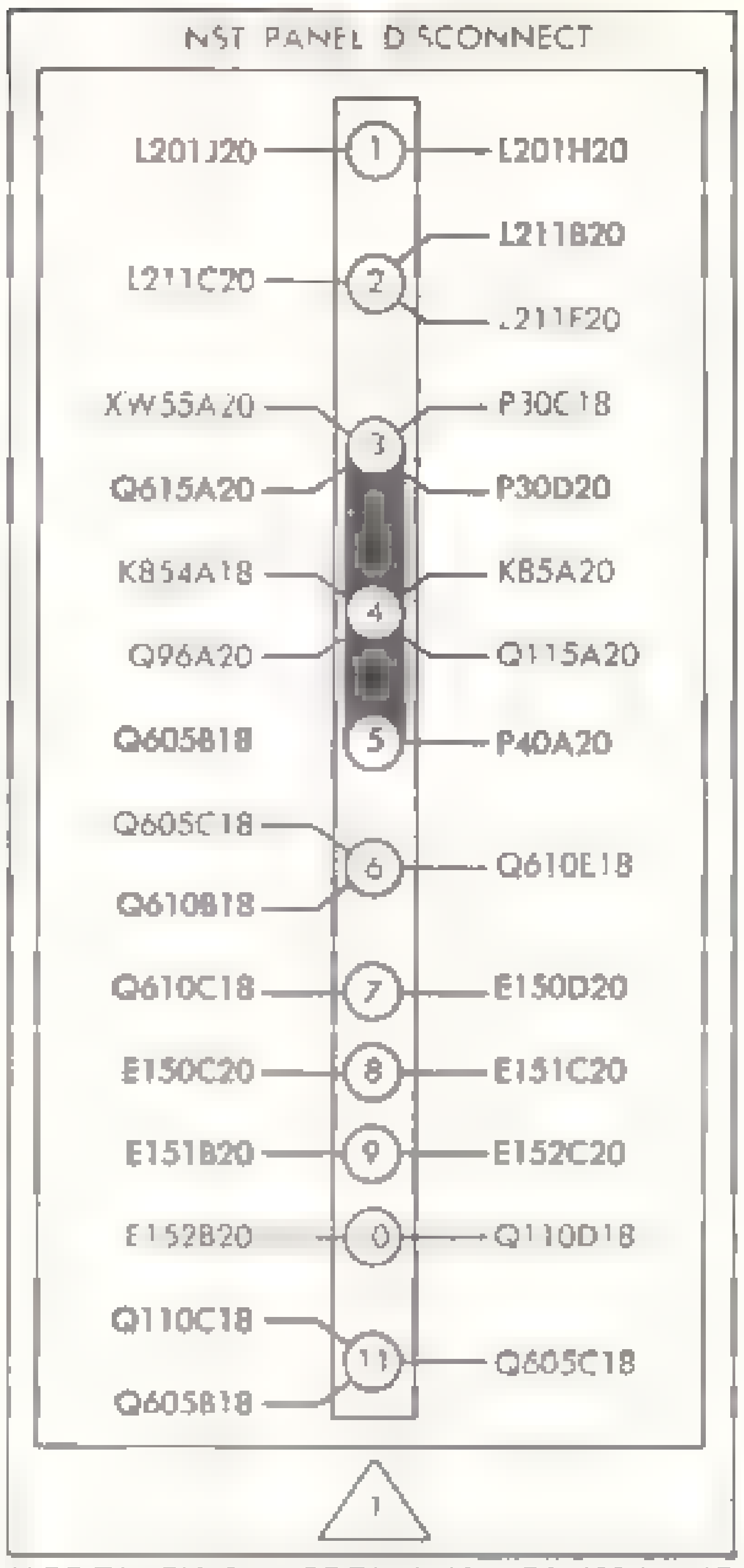


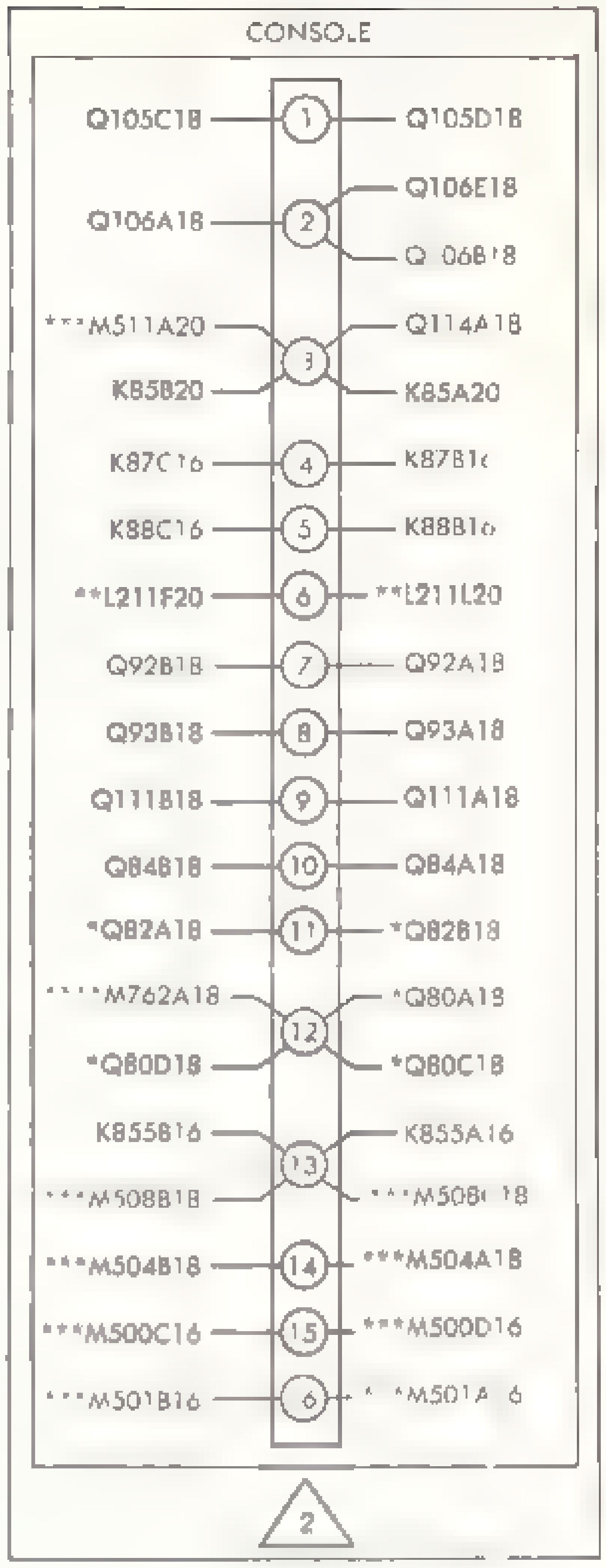
Figure 12–181. Crew alarm bell (model CH-34A serial No. 56-4313 through 57-1741 and model CH 34C)

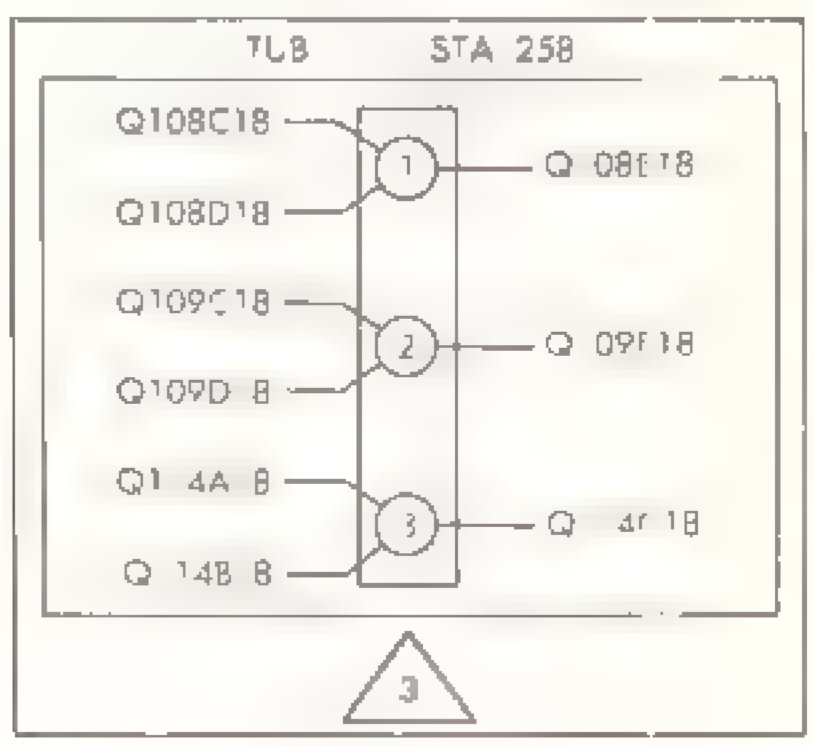


MODEL CH-34A SERIAL No. PRIOR TO 56-4284



MODEL CH-34A SERIAL No. 56-4284 AND SUBSEQUENT





*MODEL CH-34A SERIAL No. 54-2862 AND SUBSEQUENT
**USED WHEN TERMINAL STRIP IS NOT INSTALLED IN CONSOLE 56
***USED ONLY WHEN 5000 LB CARGO SLING WITH WARNING LIGHT IS INSTALLED
****MODEL CH-34A SERIAL No. 55-4489 AND SUBSEQUENT

Figure 12–182. Post terminal chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 1 of 8)

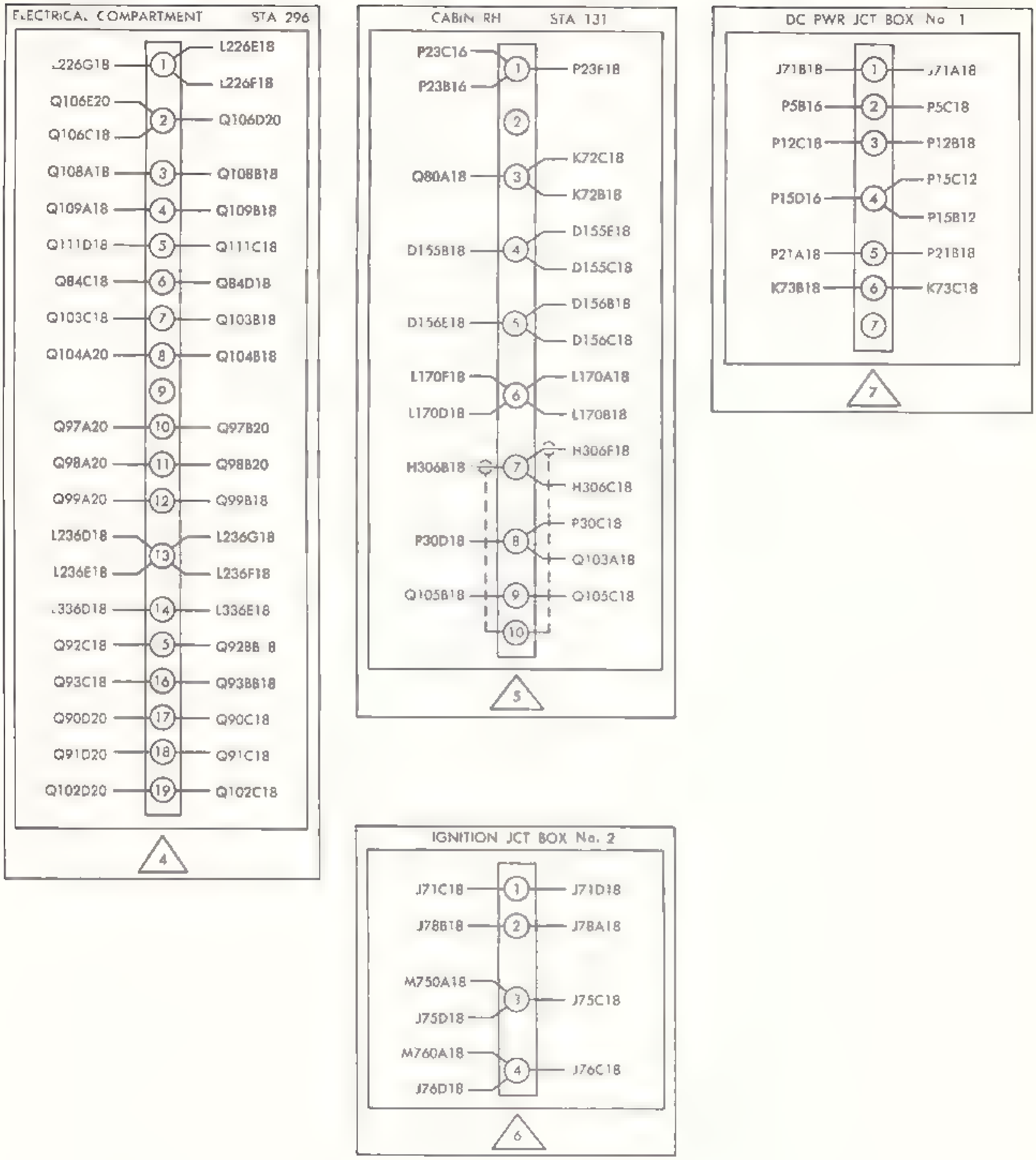
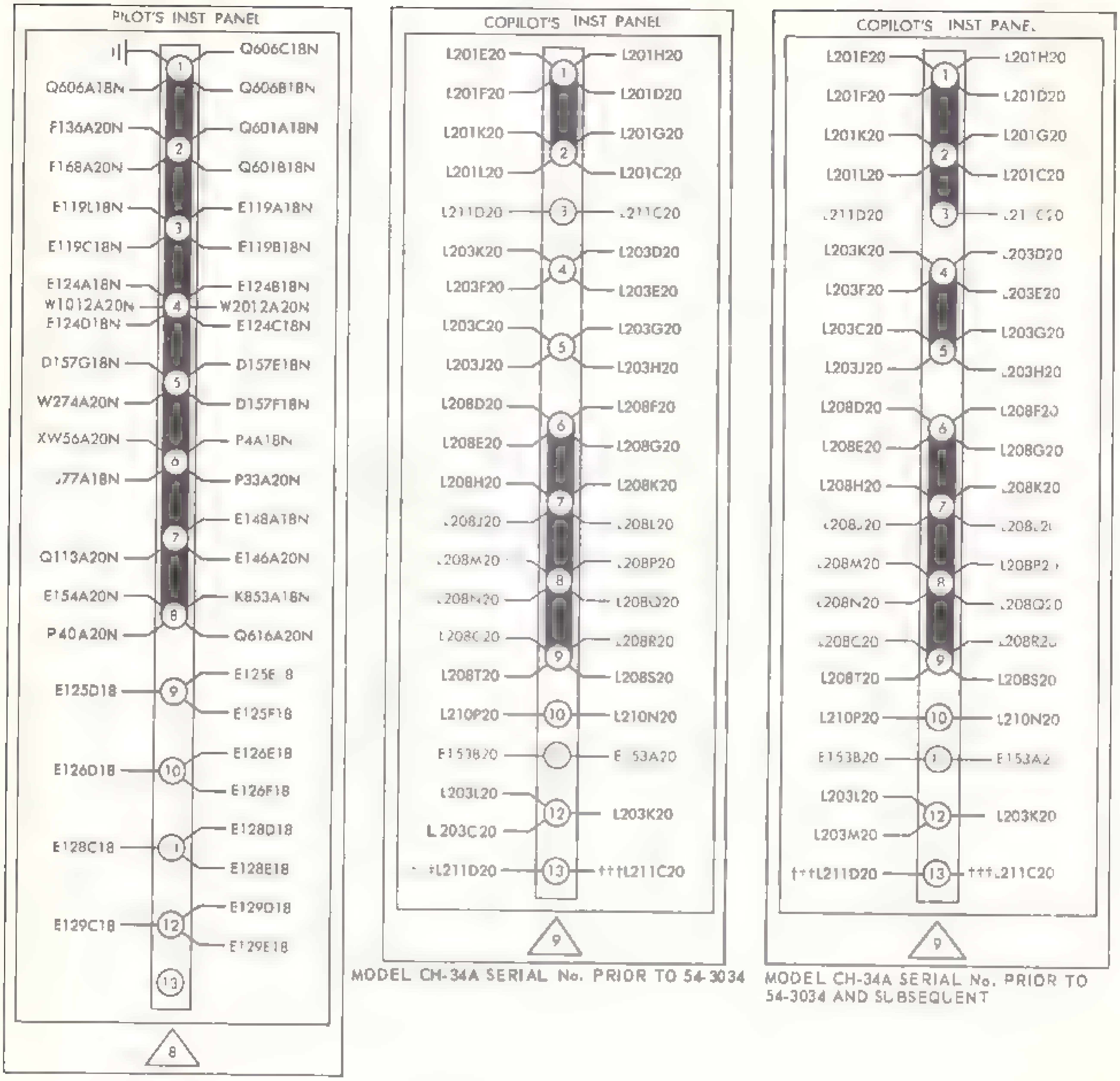
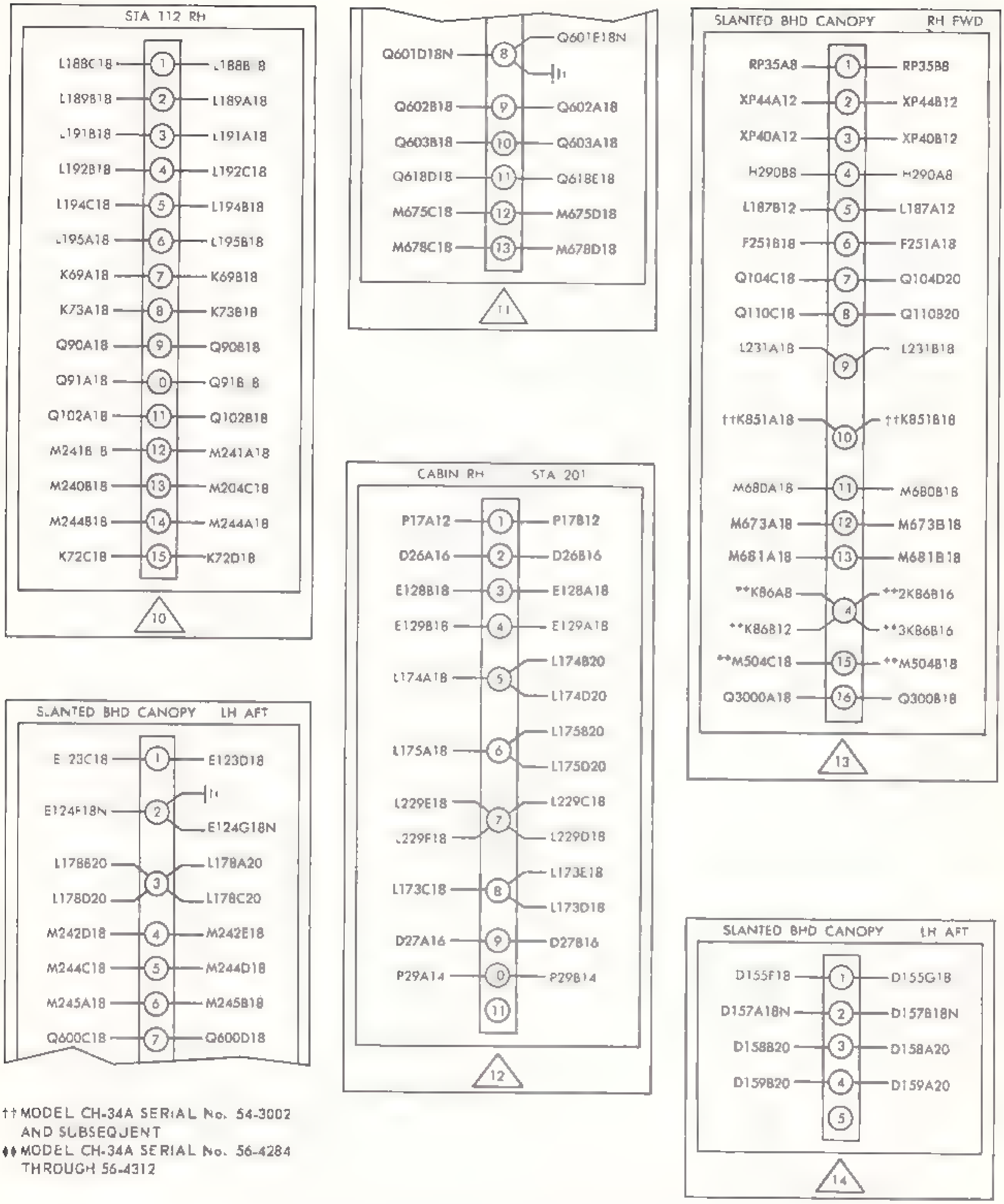


Figure 12–182. Post terminal chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 2 of 8)



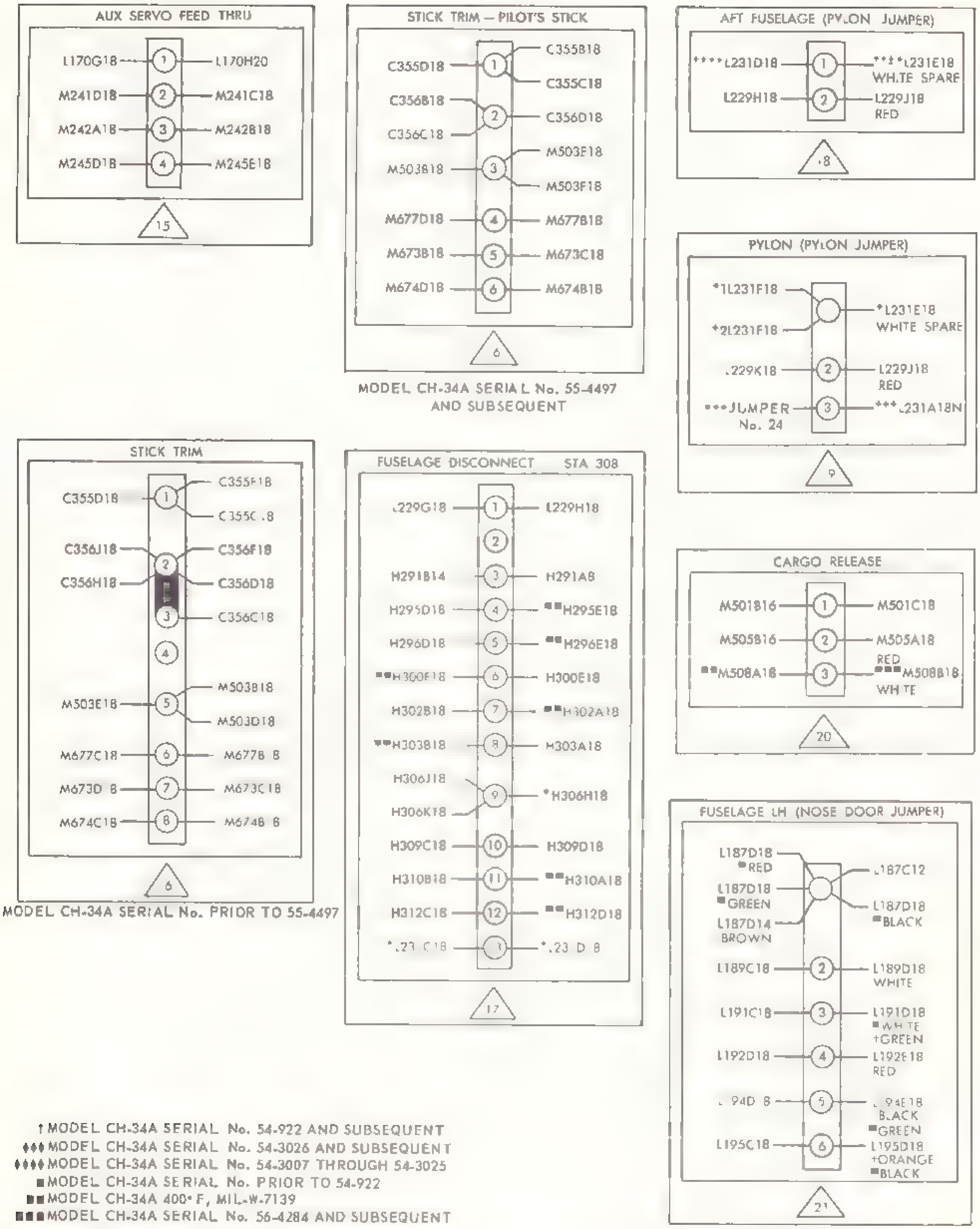
†††MODEL CH-34A SERIAL No. 54-3034 AND SUBSEQUENT

Figure 12—182. Post terminal chart — electrical (model CH-34A serial No. prior to 56-4313) (Sheet 3 of 8)



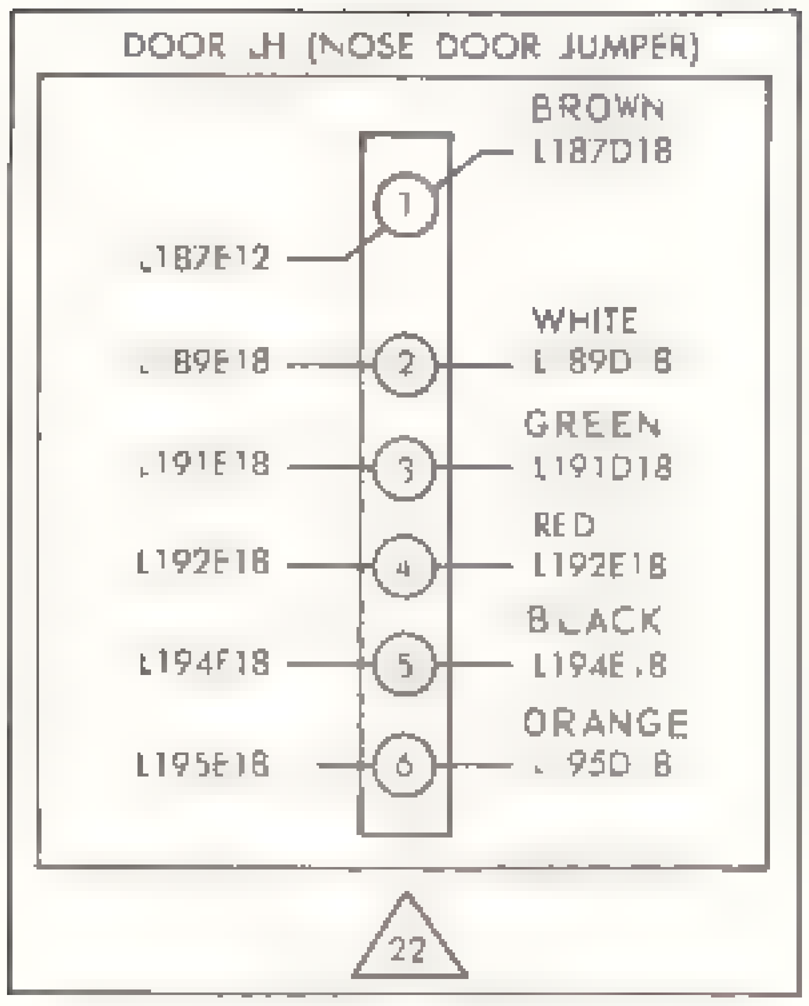
††MODEL CH-34A SERIAL No. 54-3002 AND SUBSEQUENT
♦♦MODEL CH-34A SERIAL No. 56-4284 THROUGH 56-4312

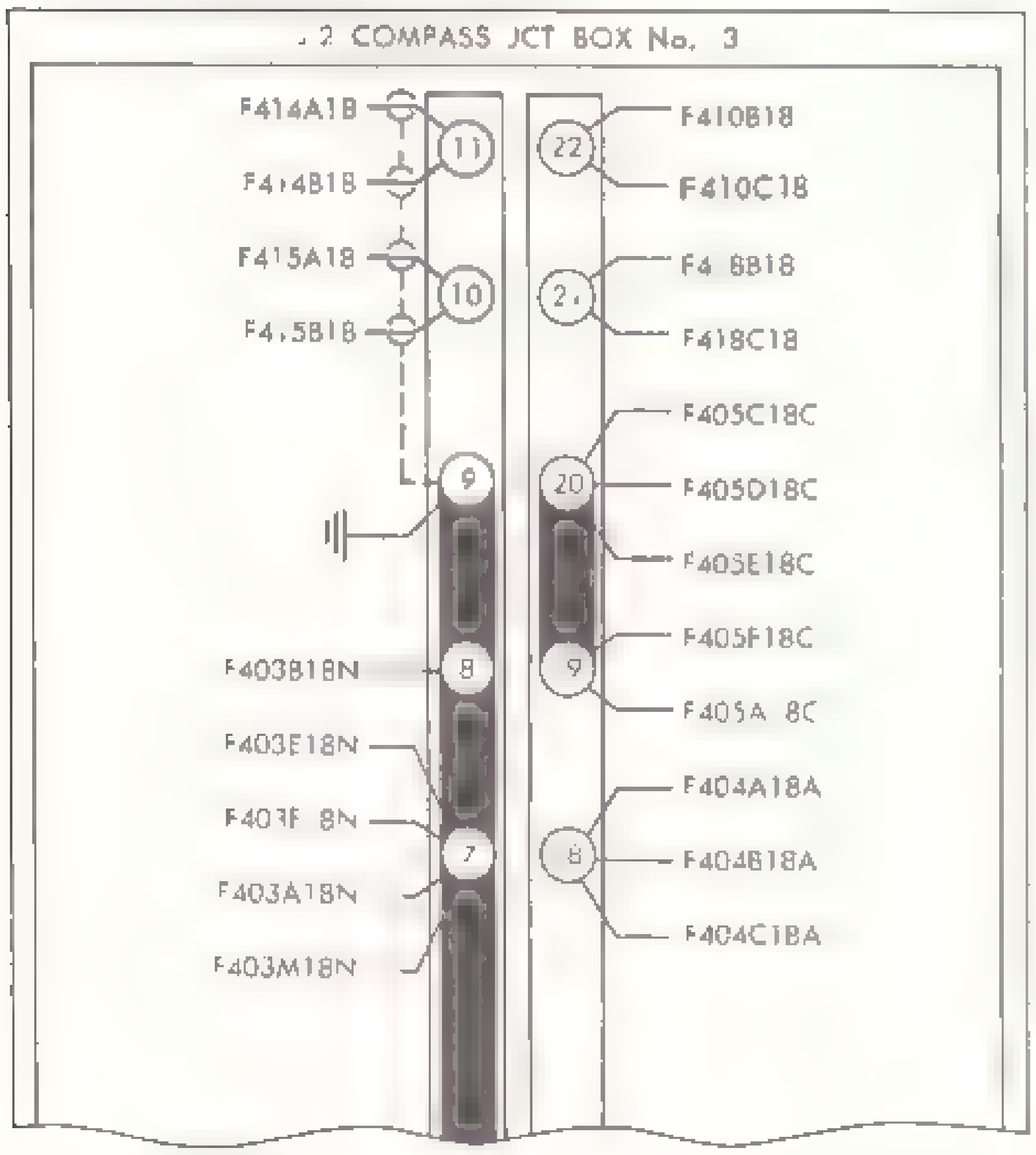
Figure 12–182. Post terminal chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 4 of 8)

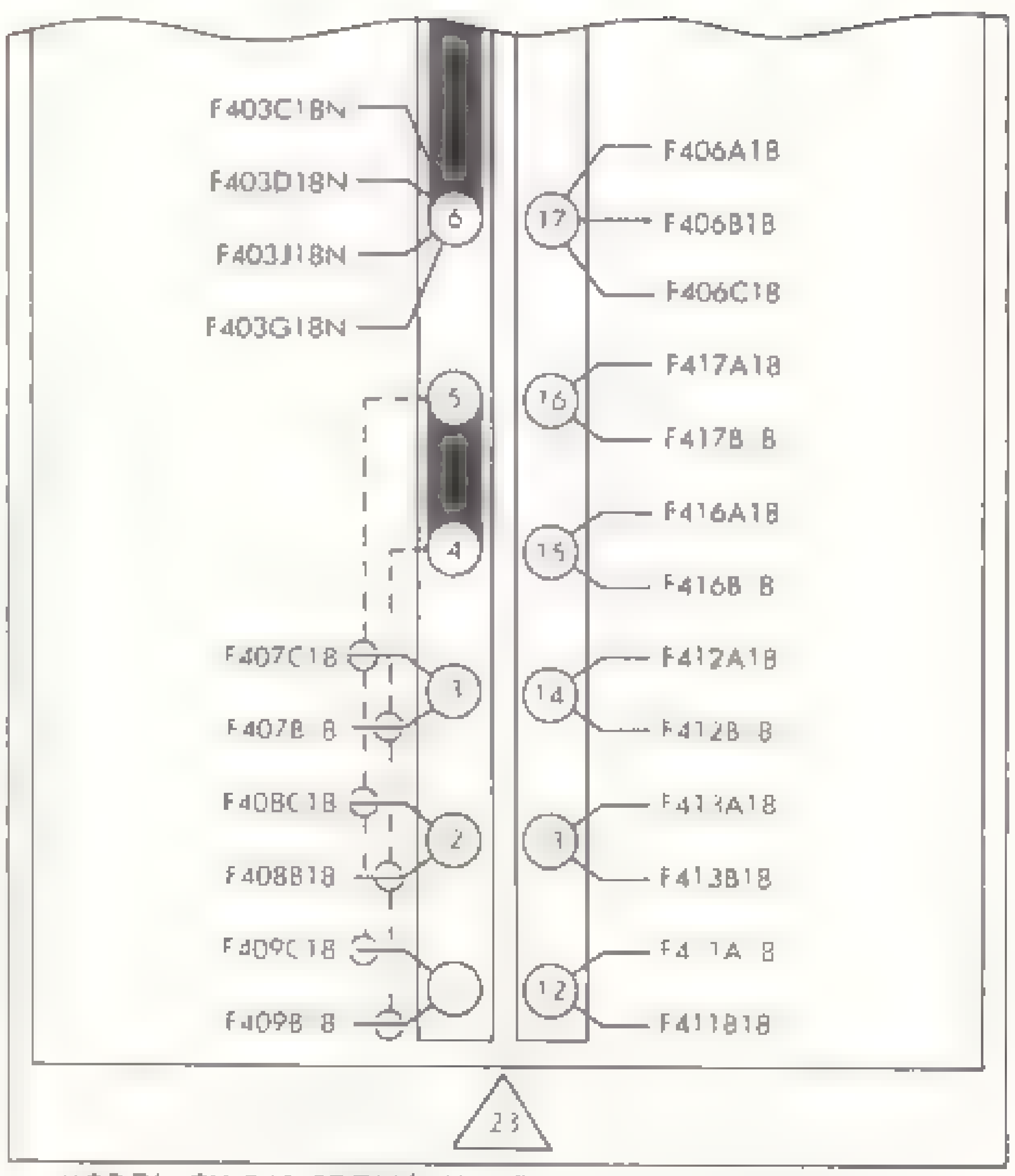


† MODEL CH-34A SERIAL No. 54-922 AND SUBSEQUENT
♦♦♦ MODEL CH-34A SERIAL No. 54-3026 AND SUBSEQUENT
♦♦♦♦ MODEL CH-34A SERIAL No. 54-3007 THROUGH 54-3025
■ MODEL CH-34A SERIAL No. PRIOR TO 54-922
■■ MODEL CH-34A 400° F, MIL-W-7139
■■■ MODEL CH-34A SERIAL No. 56-4284 AND SUBSEQUENT

Figure 12—182. Post terminal chart — electrical (model CH-34A serial No. prior to 56-4313) (Sheet 5 of 8)

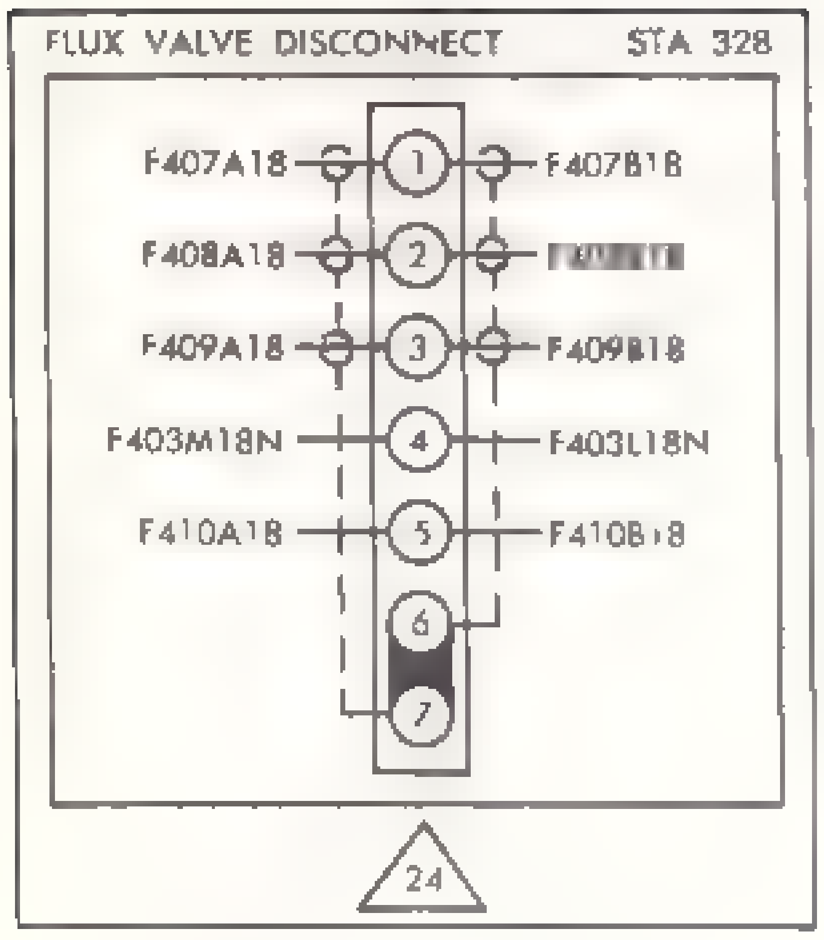






MODEL CH-34A SERIAL No. 53-4475 AND SUBSEQUENT

Figure 12–182. Post terminal chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 6 of 8)



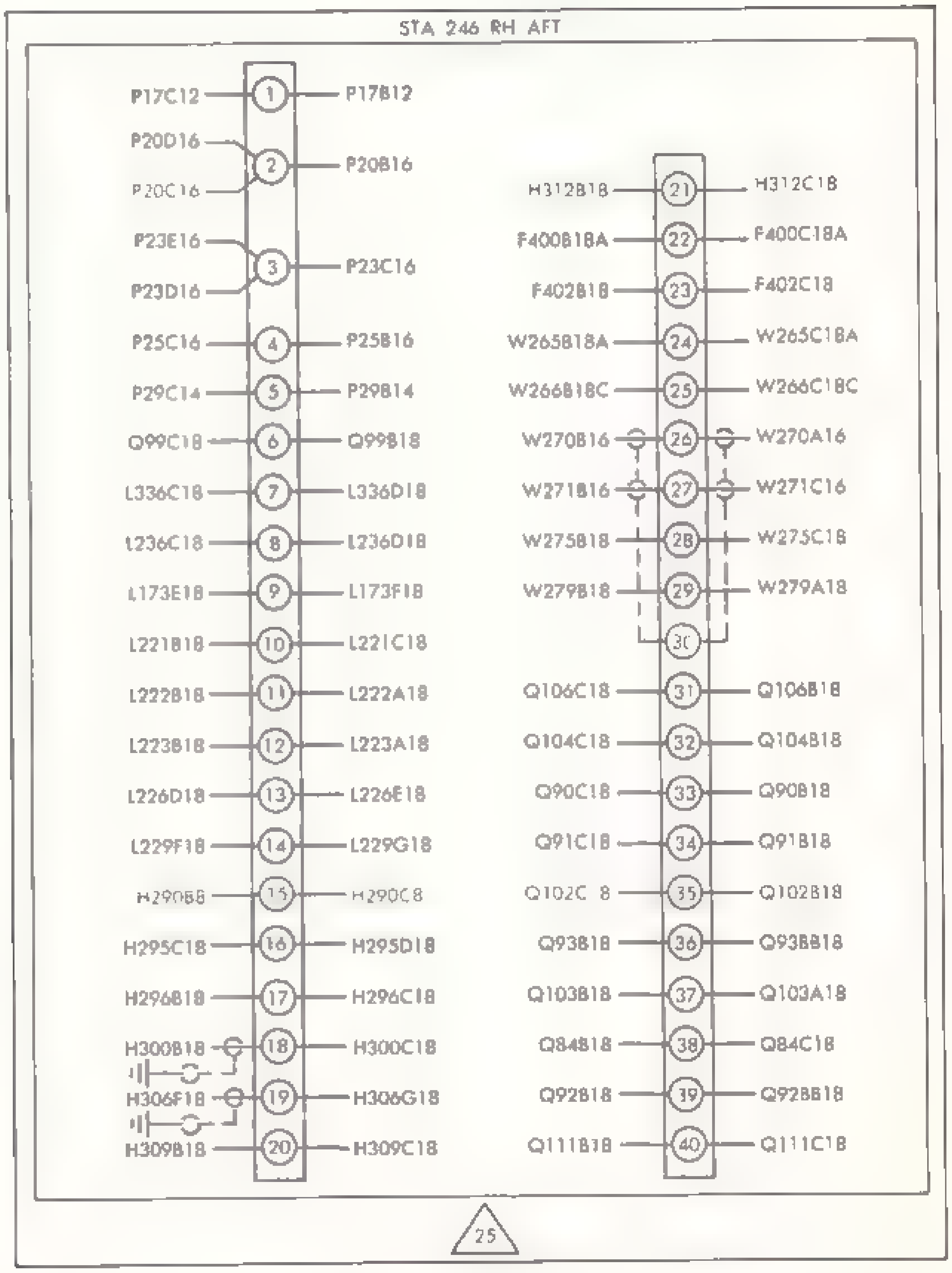
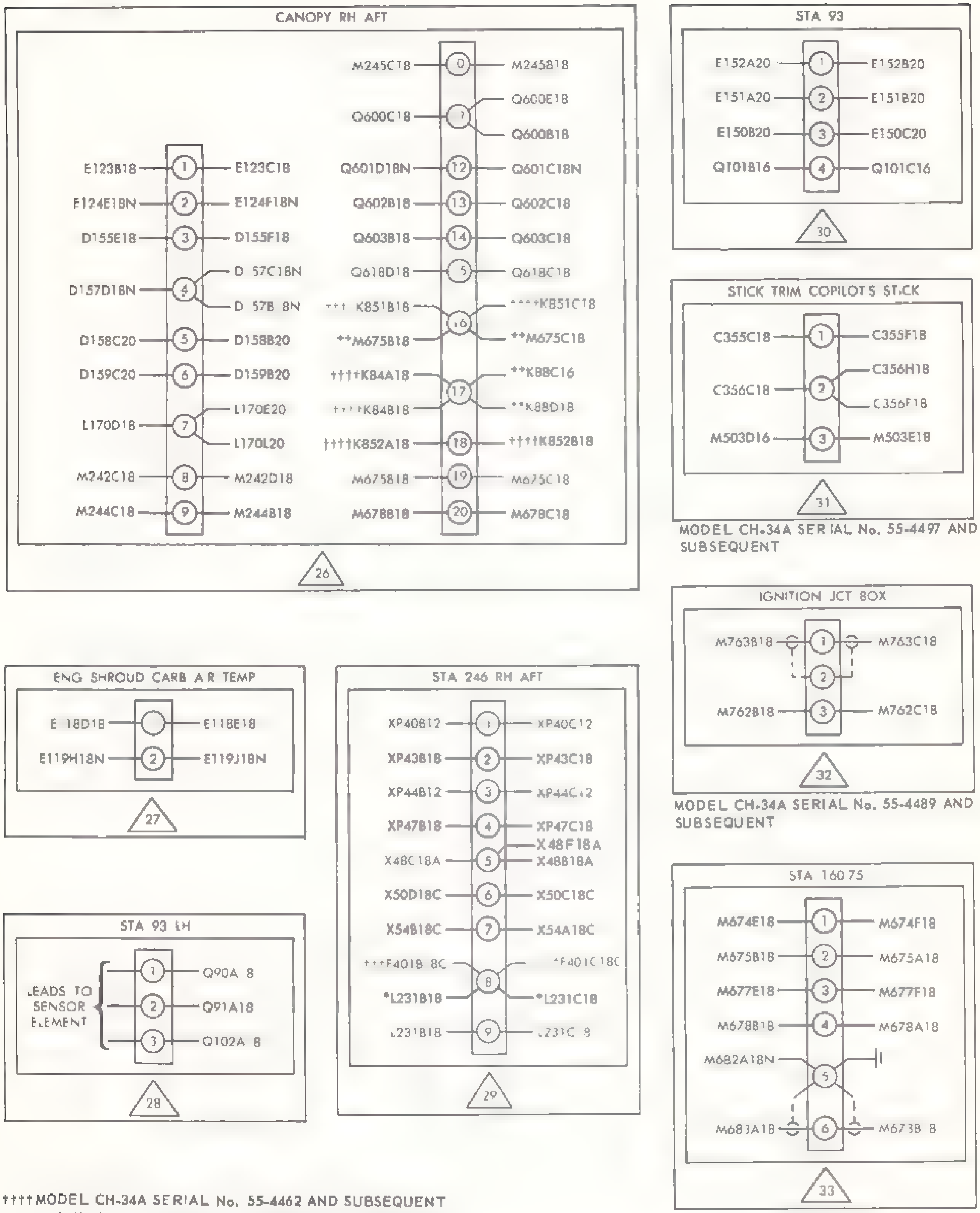


Figure 12–182. Post terminal chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 7 of 8)



††††MODEL CH-34A SERIAL No. 55-4462 AND SUBSEQUENT
♦MODEL CH-34A SERIAL No. 54-3007 AND SUBSEQUENT
♦♦MODEL CH-34A SERIAL No. 56-4284 THROUGH 56-4312

Figure 12—182. Post terminal chart — electrical (model CH-34A serial No. prior to 56-4313) (Sheet 8 of 8)

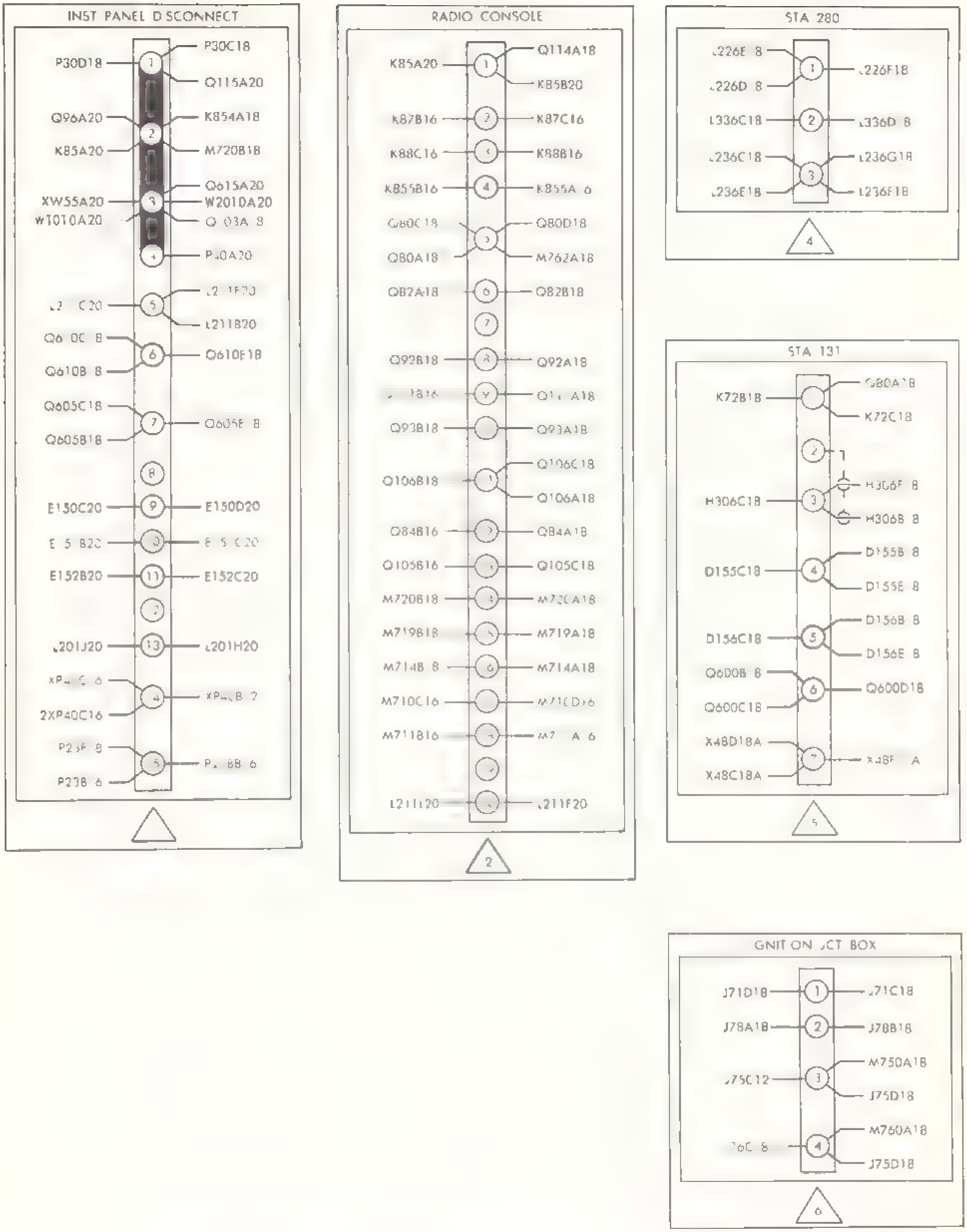
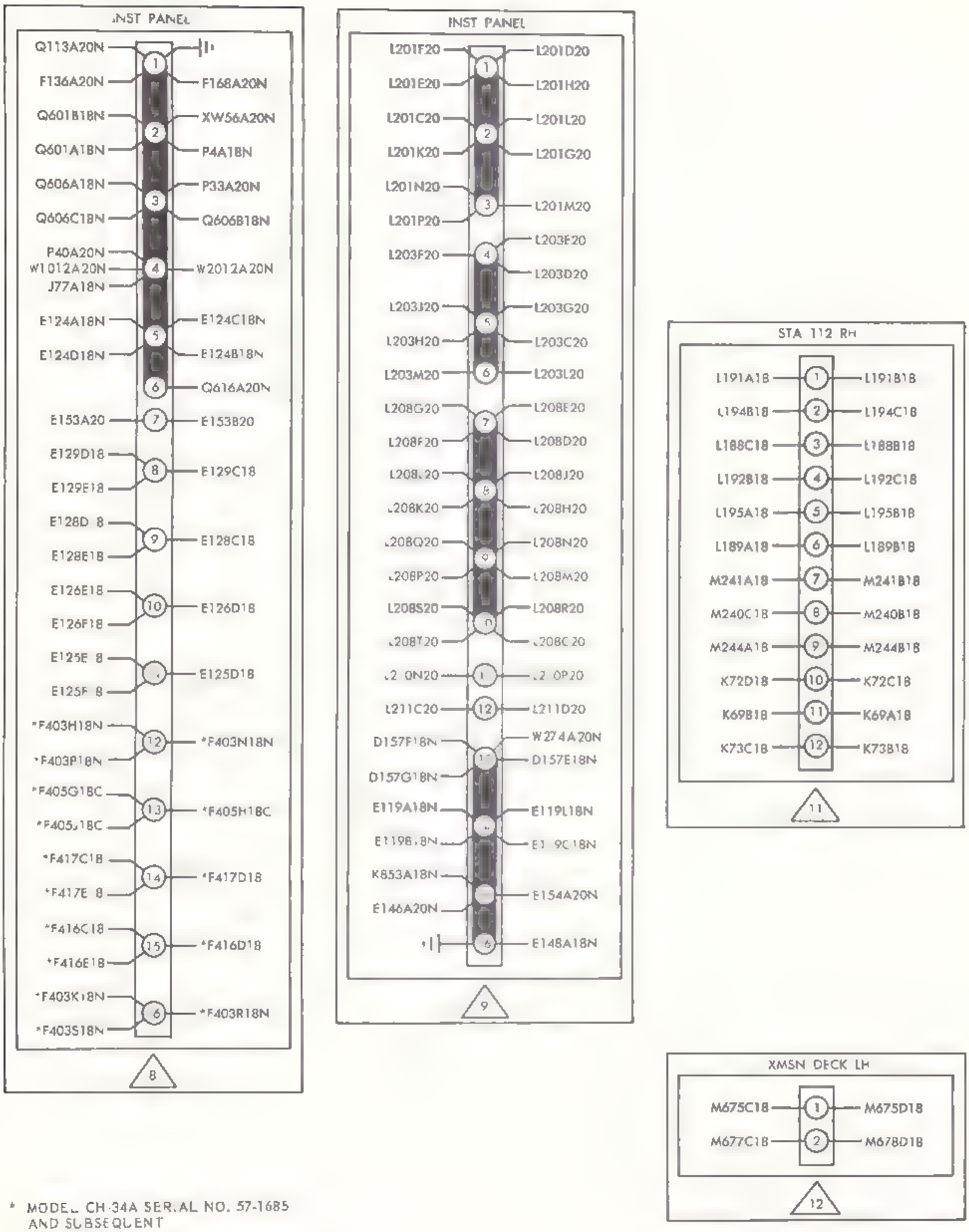


Figure 12–183. Post terminal chart – electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 1 of 6)



* MODEL CH-34A SERIAL NO. 57-1685 AND SUBSEQUENT

Figure 12–183. Post terminal chart – electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 2 of 6)

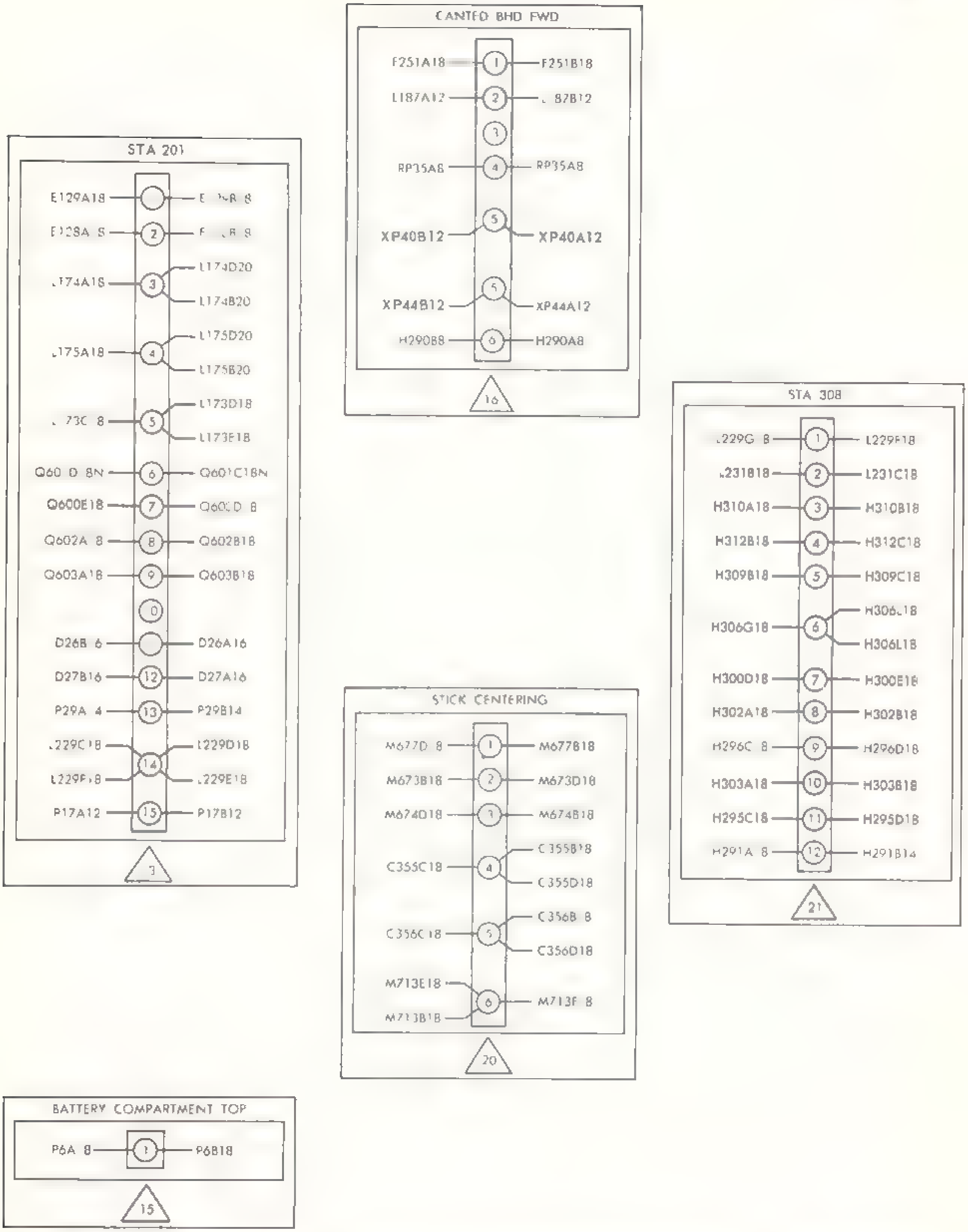


Figure 12—183. Post terminal chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 3 of 6)

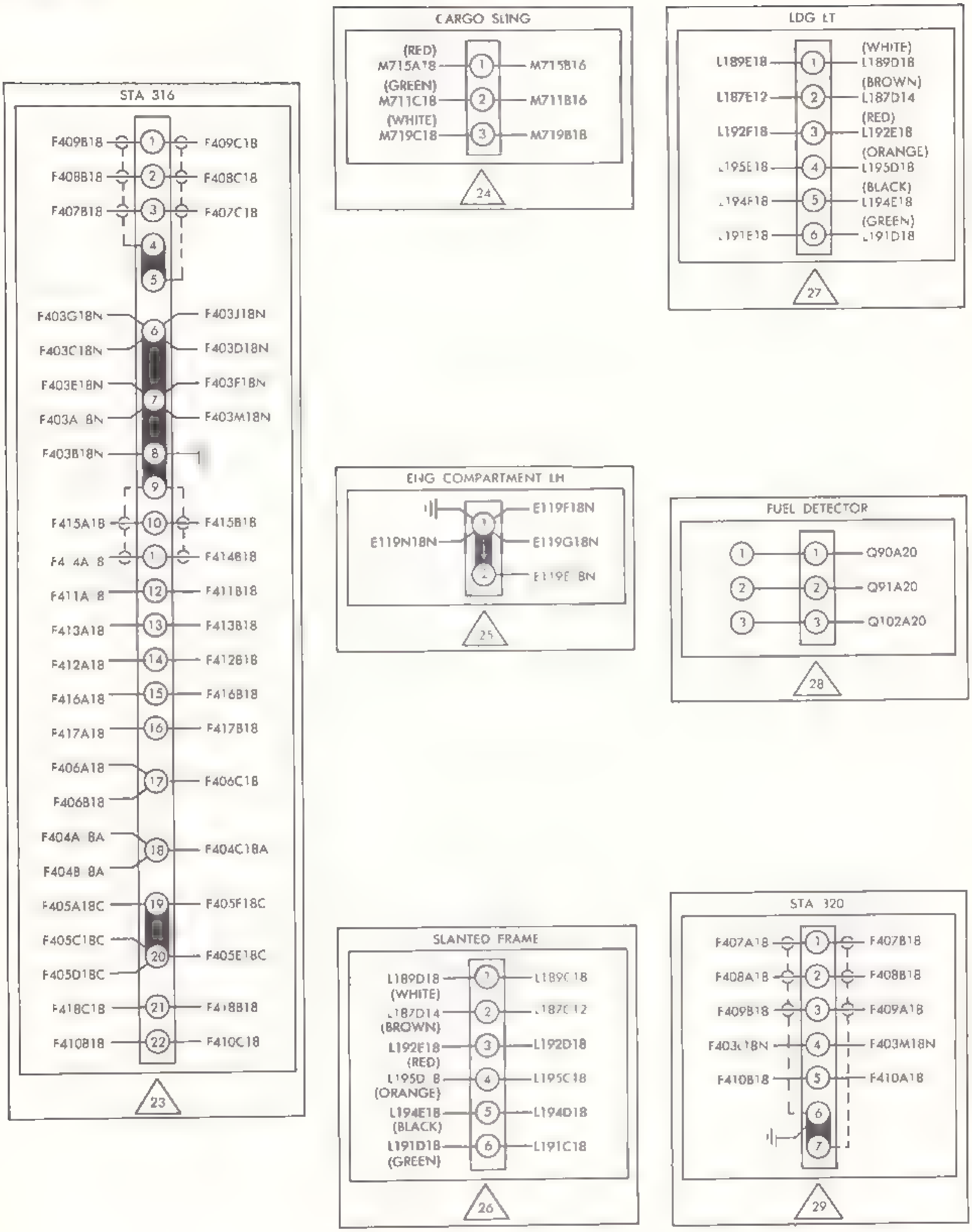
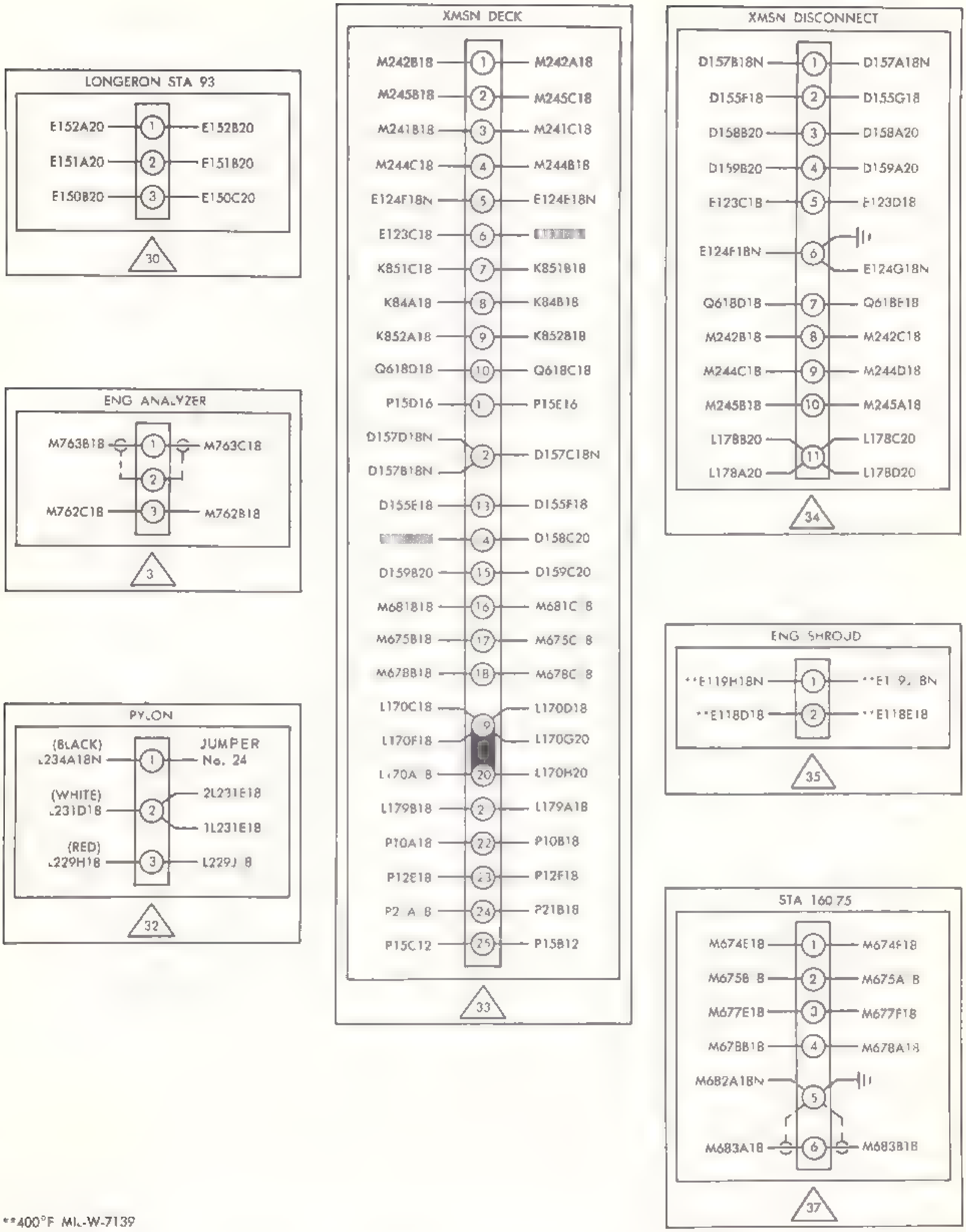
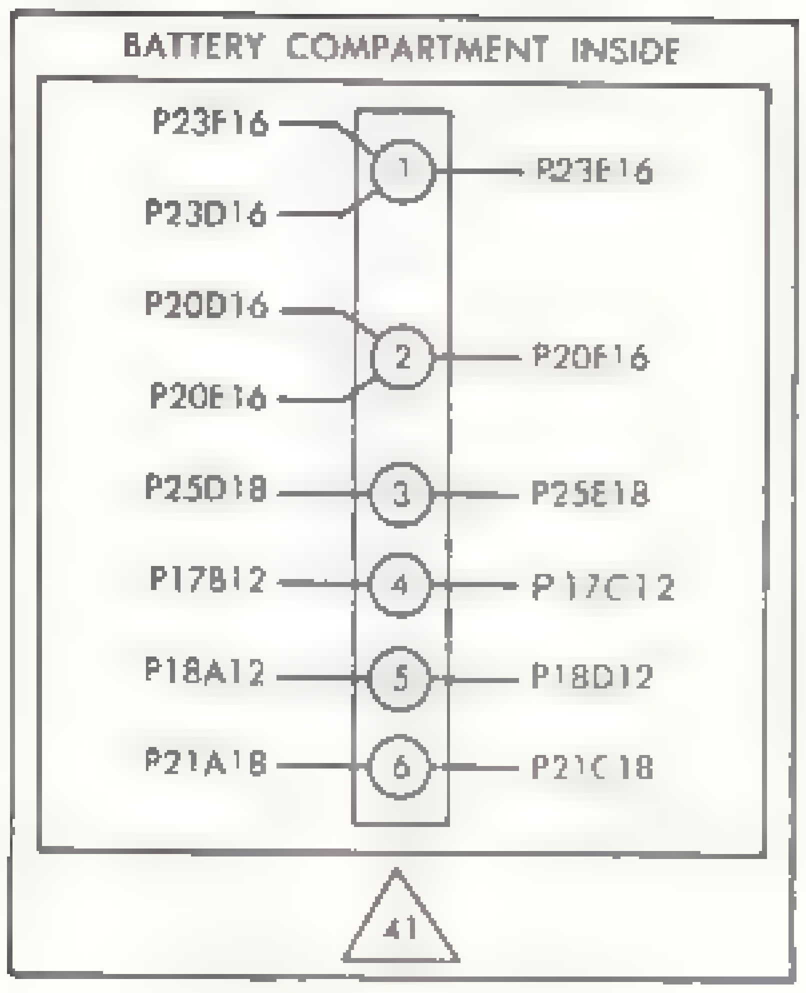


Figure 12–183. Post terminal chart – electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 4 of 6)



**400°F MIL-W-7139

Figure 12—183. Post terminal chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 5 of 6)



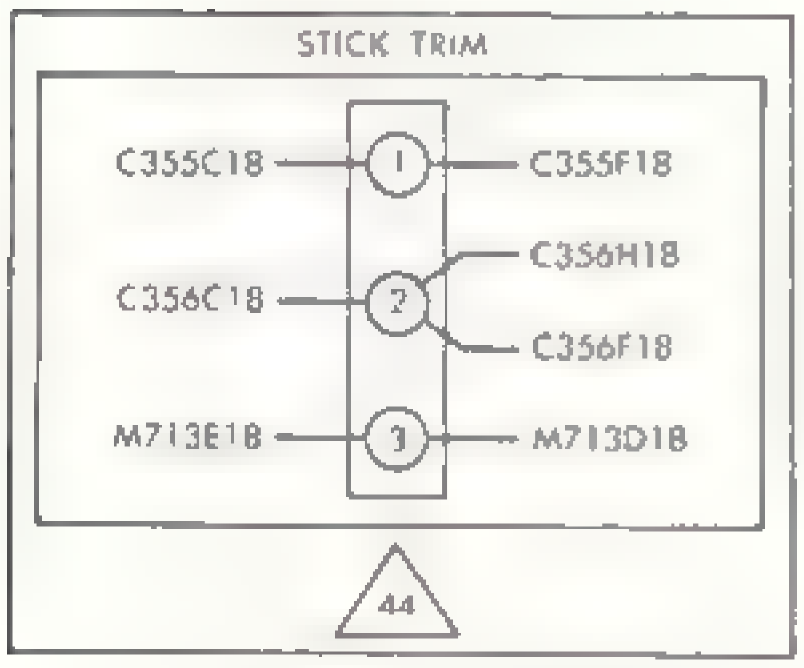


Figure 12—183. Post terminal chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 6 of 6)

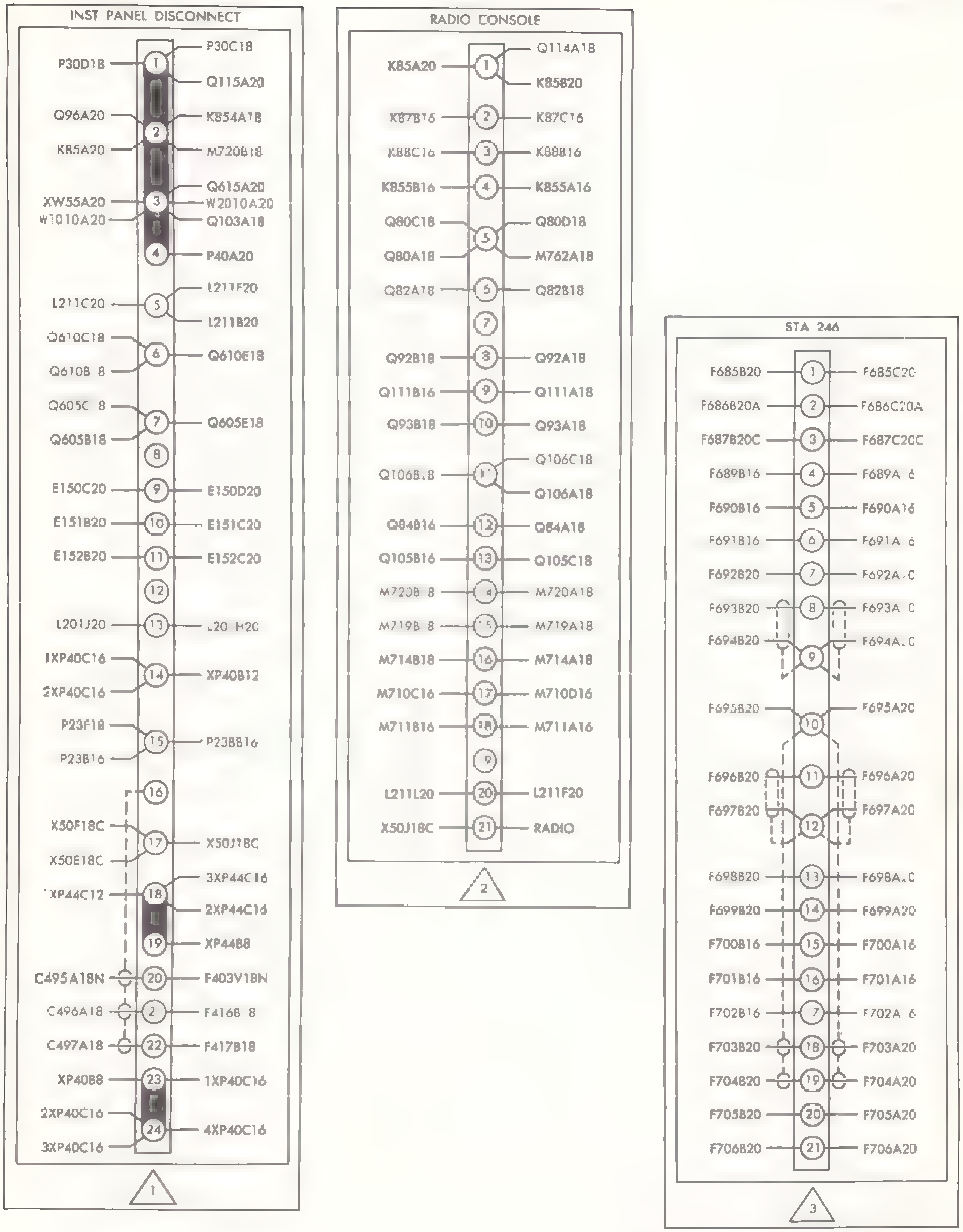


Figure 12–184. Post terminal chart – electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 1 of 6)

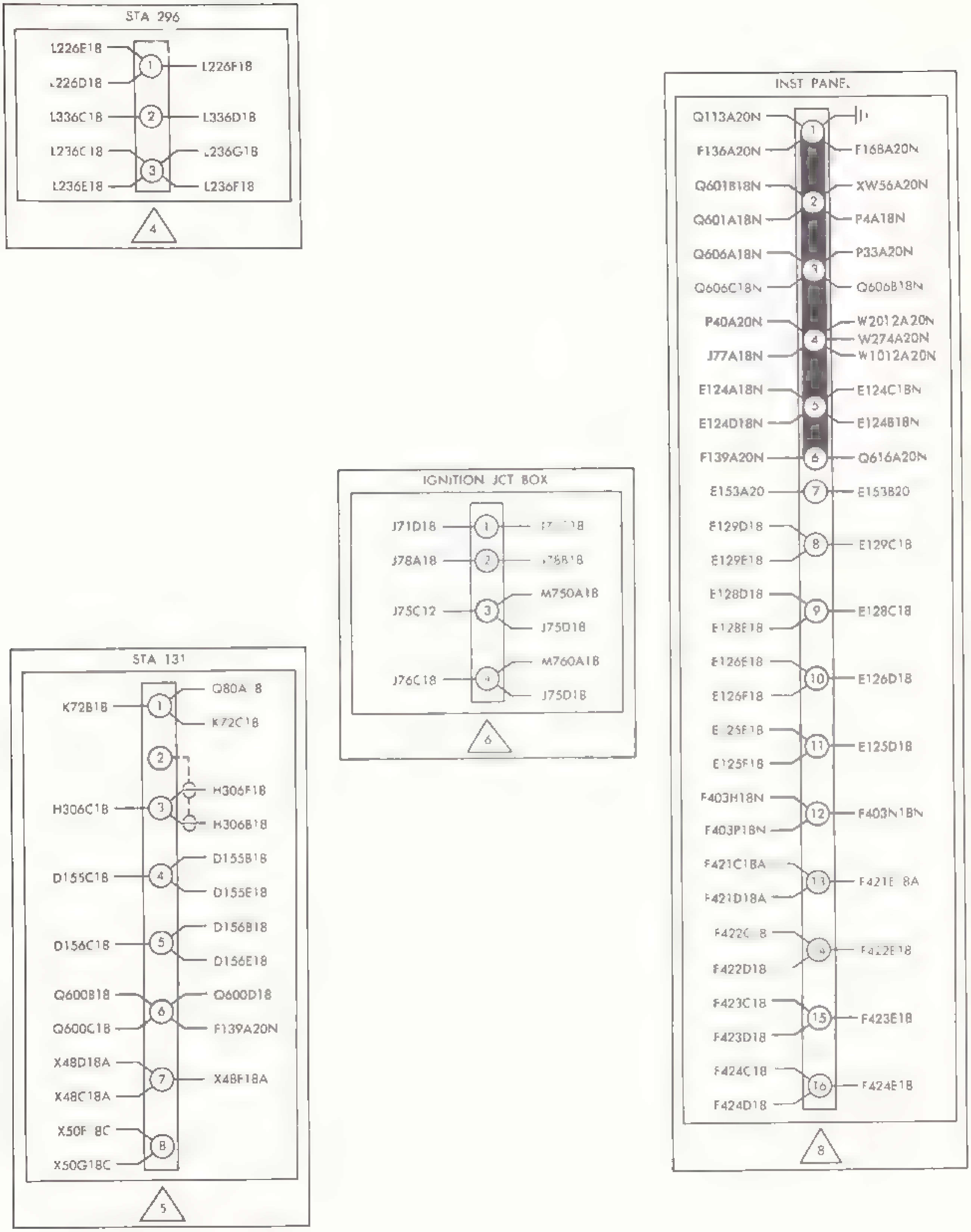


Figure 12–184. Post terminal chart — electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 2 of 6)

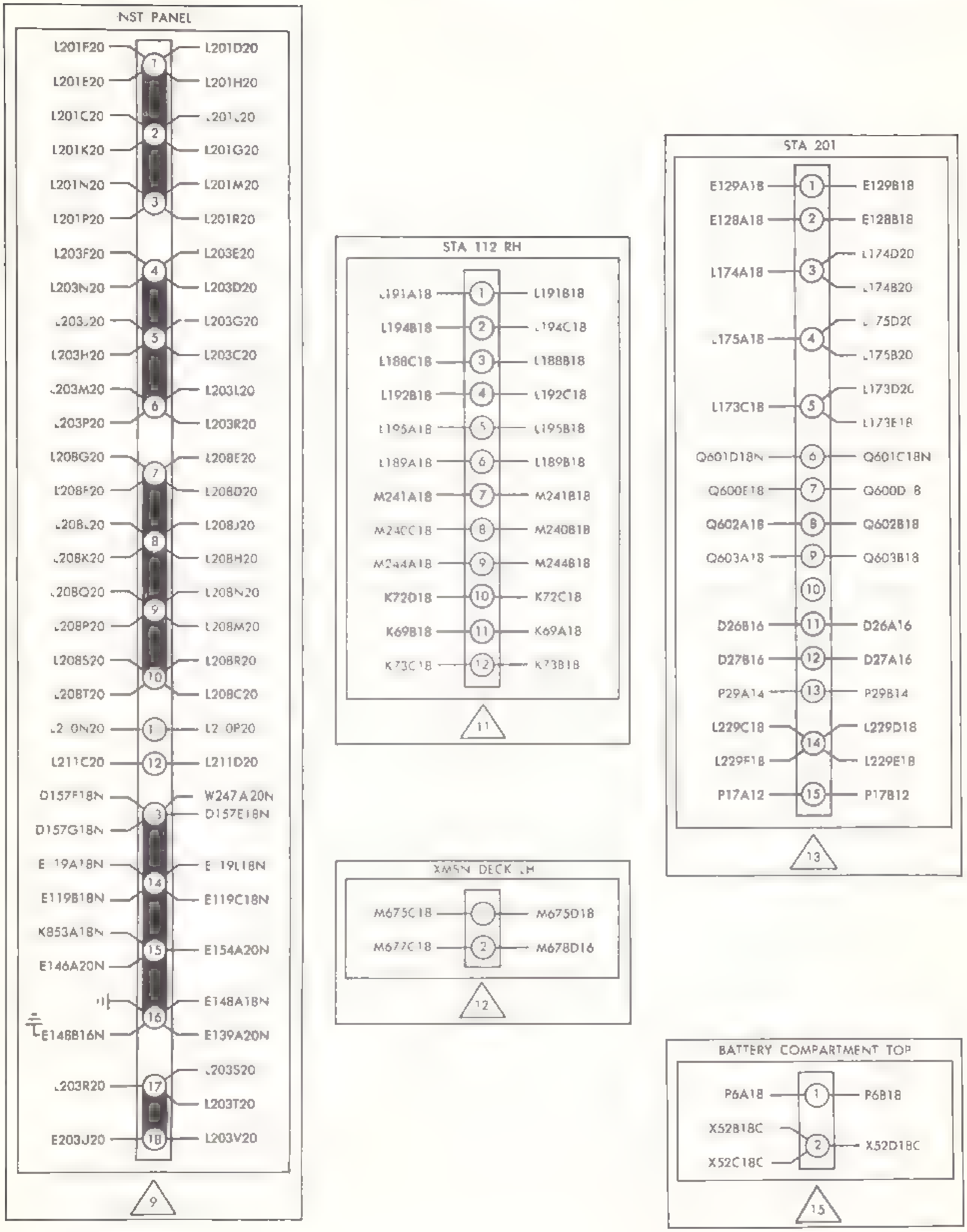


Figure 12–184. Post terminal chart – electrical (model CH-34C serial No. 57 1742 and subsequent) (Sheet 3 of 6)

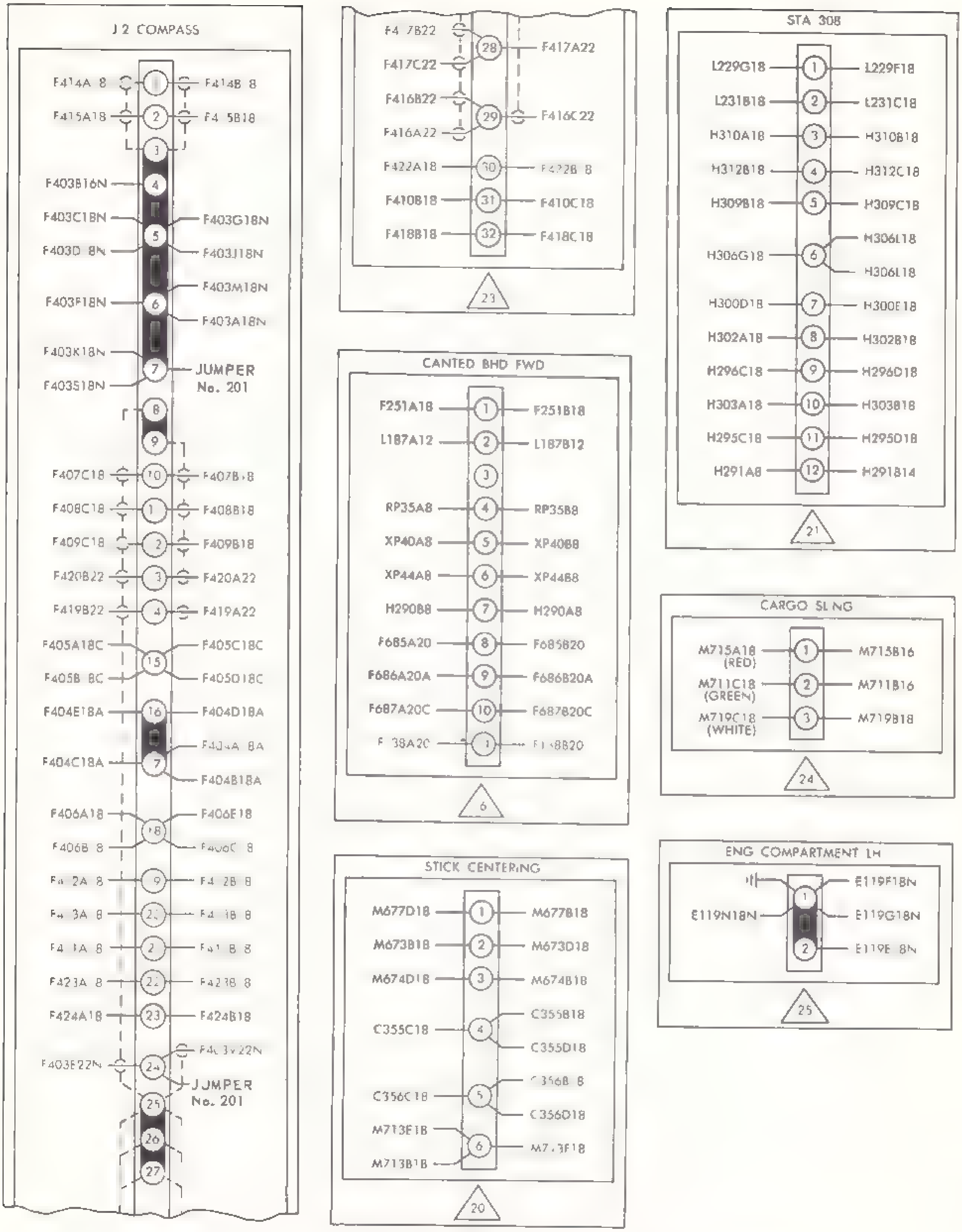


Figure 12–184. Post terminal chart – electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 4 of 6)

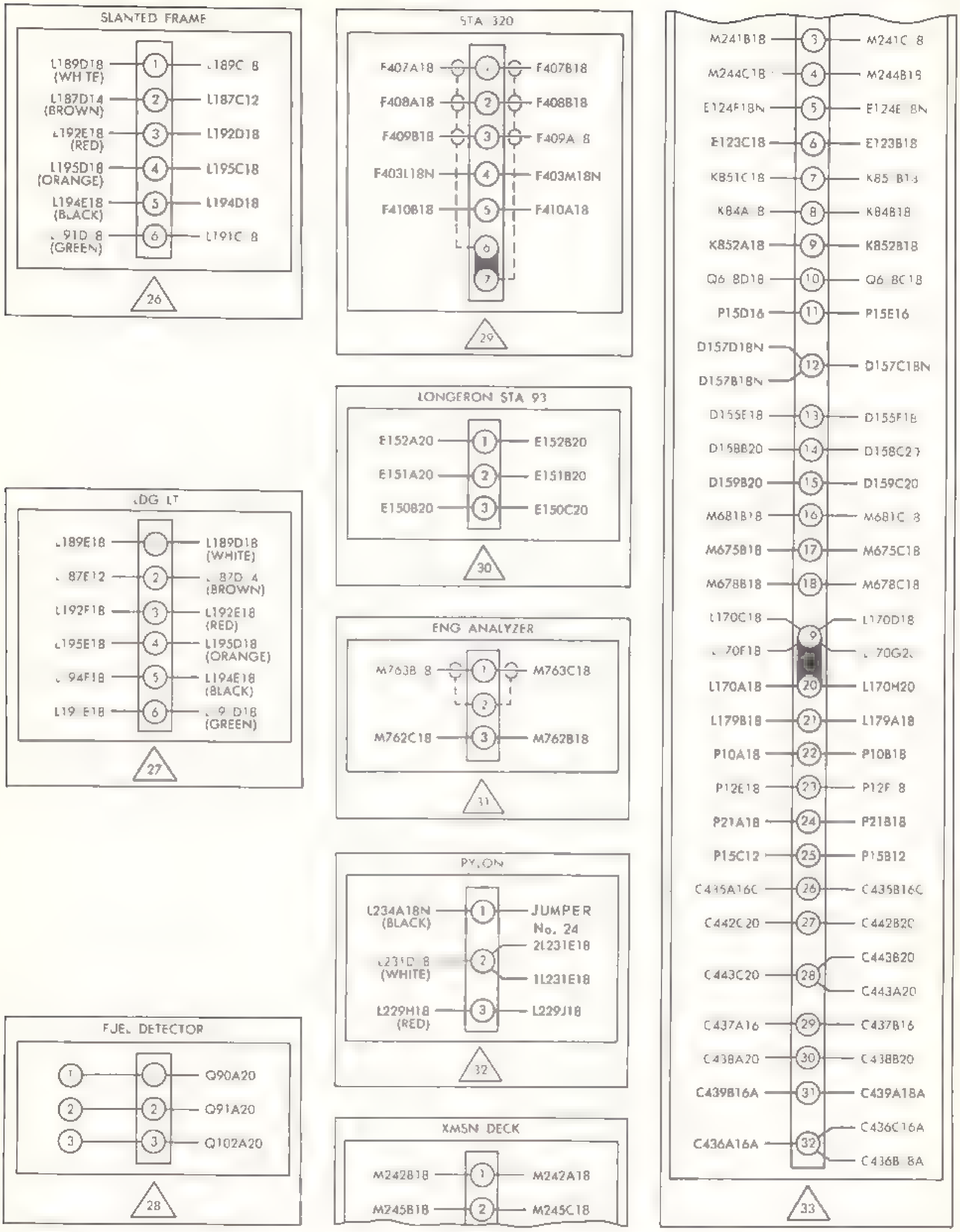


Figure 12–184. Post terminal chart – electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 5 of 6)

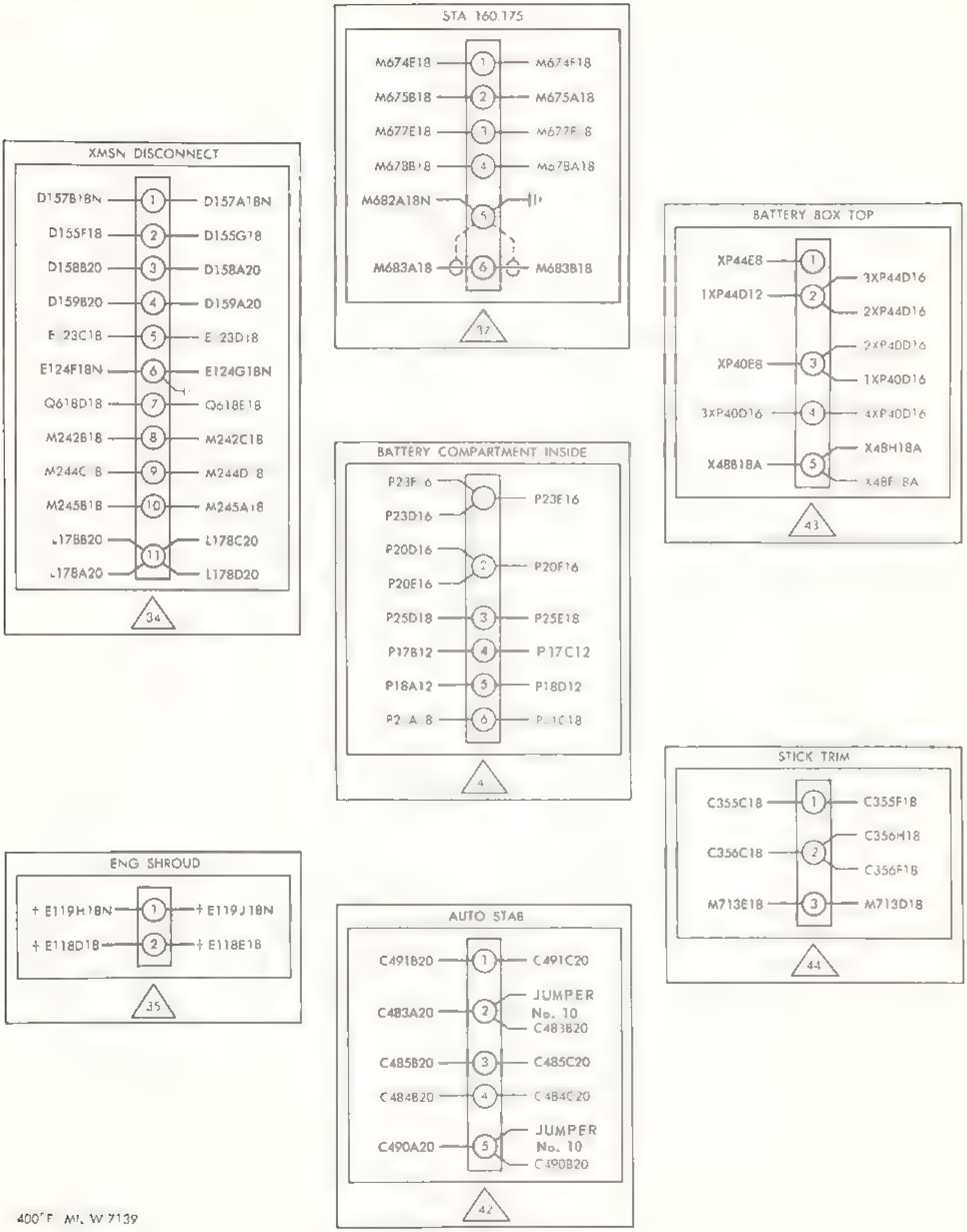


Figure 12–184. Post terminal chart – electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 6 of 6)

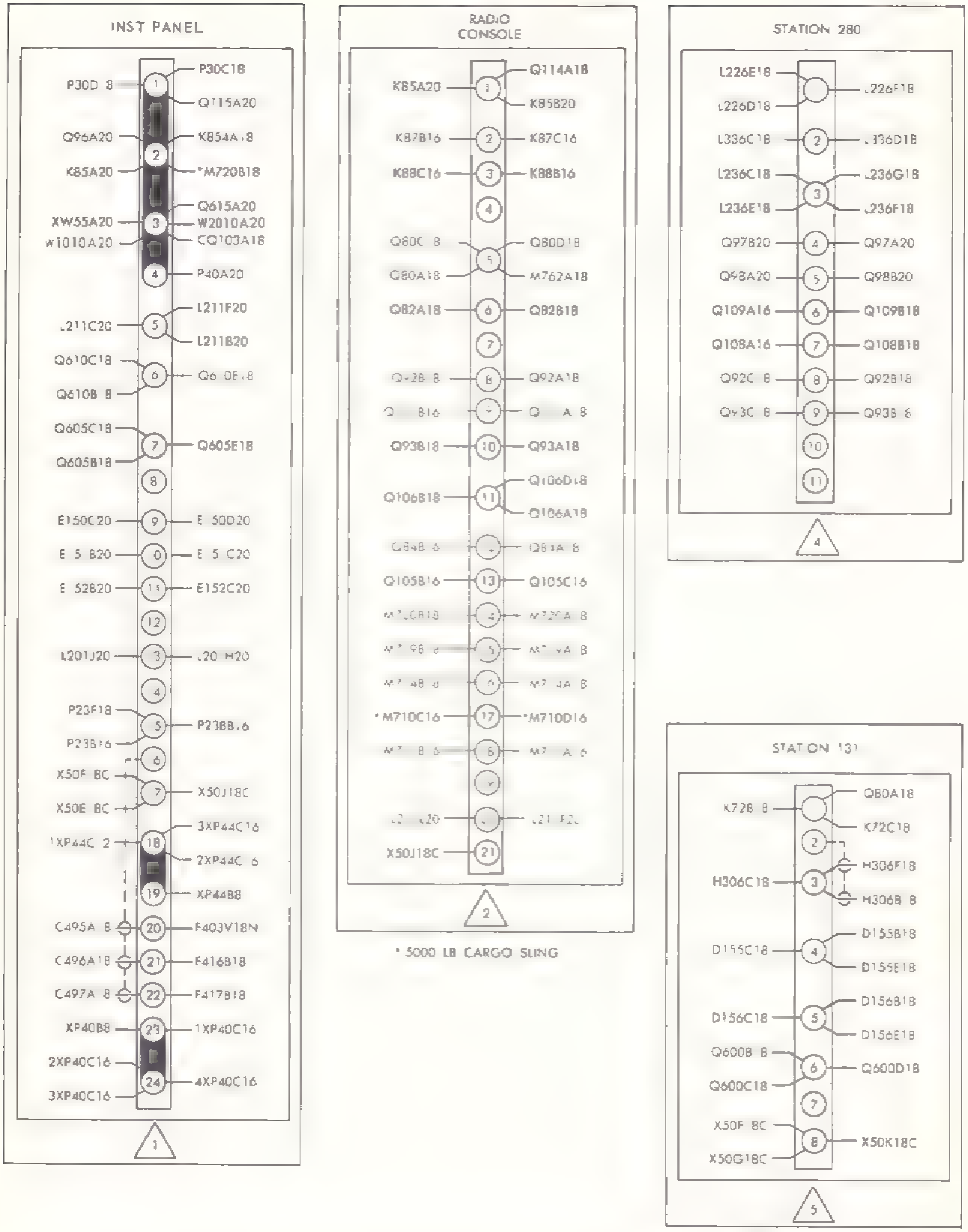


Figure 12–185. Post terminal chart – electrical (model CH-34C serial No. prior to 57-1742) (Sheet 1 of 7)

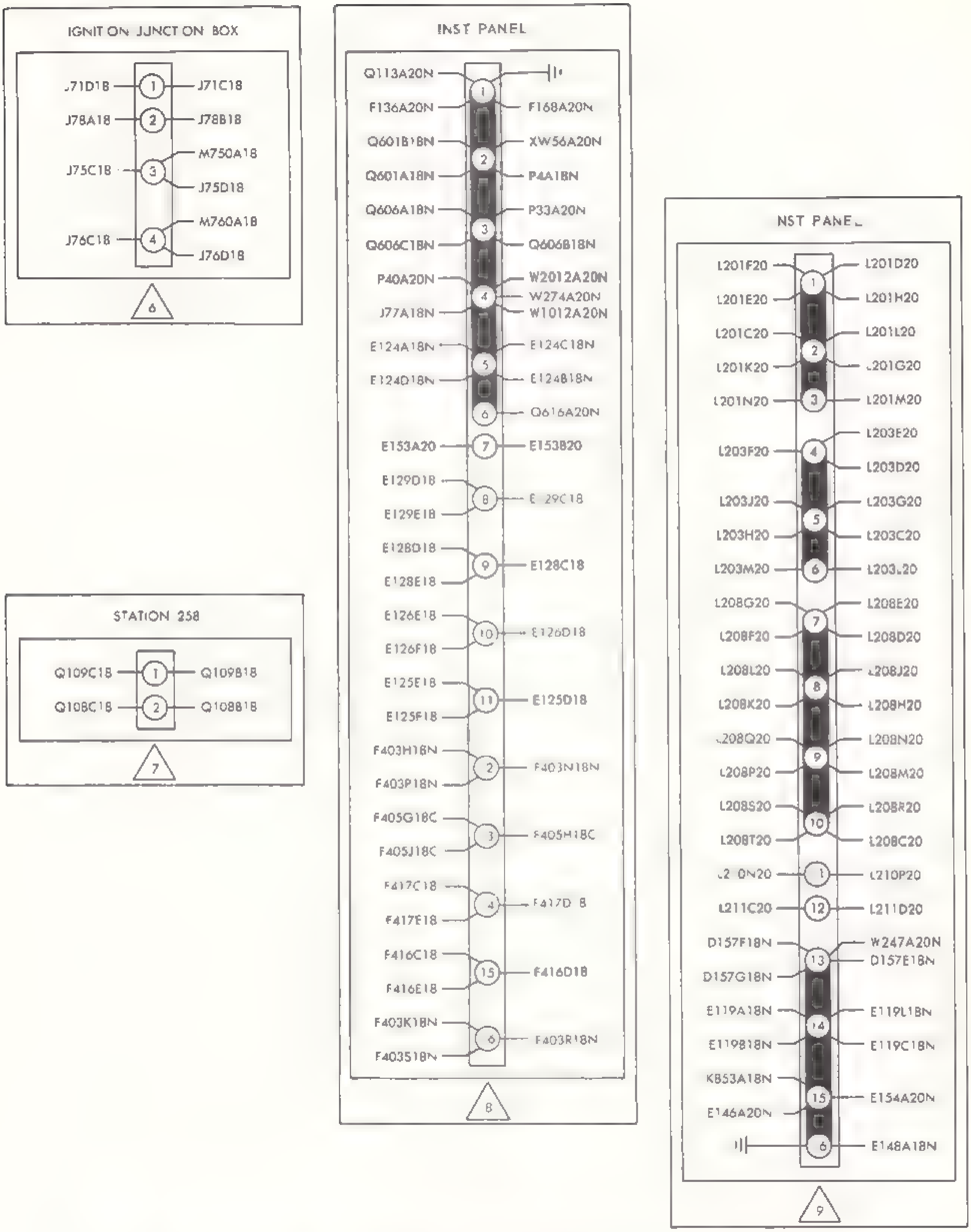


Figure 12–185 Post terminal chart – electrical (model CH 34C serial No. prior to 57 1742) (Sheet 2 of 7)

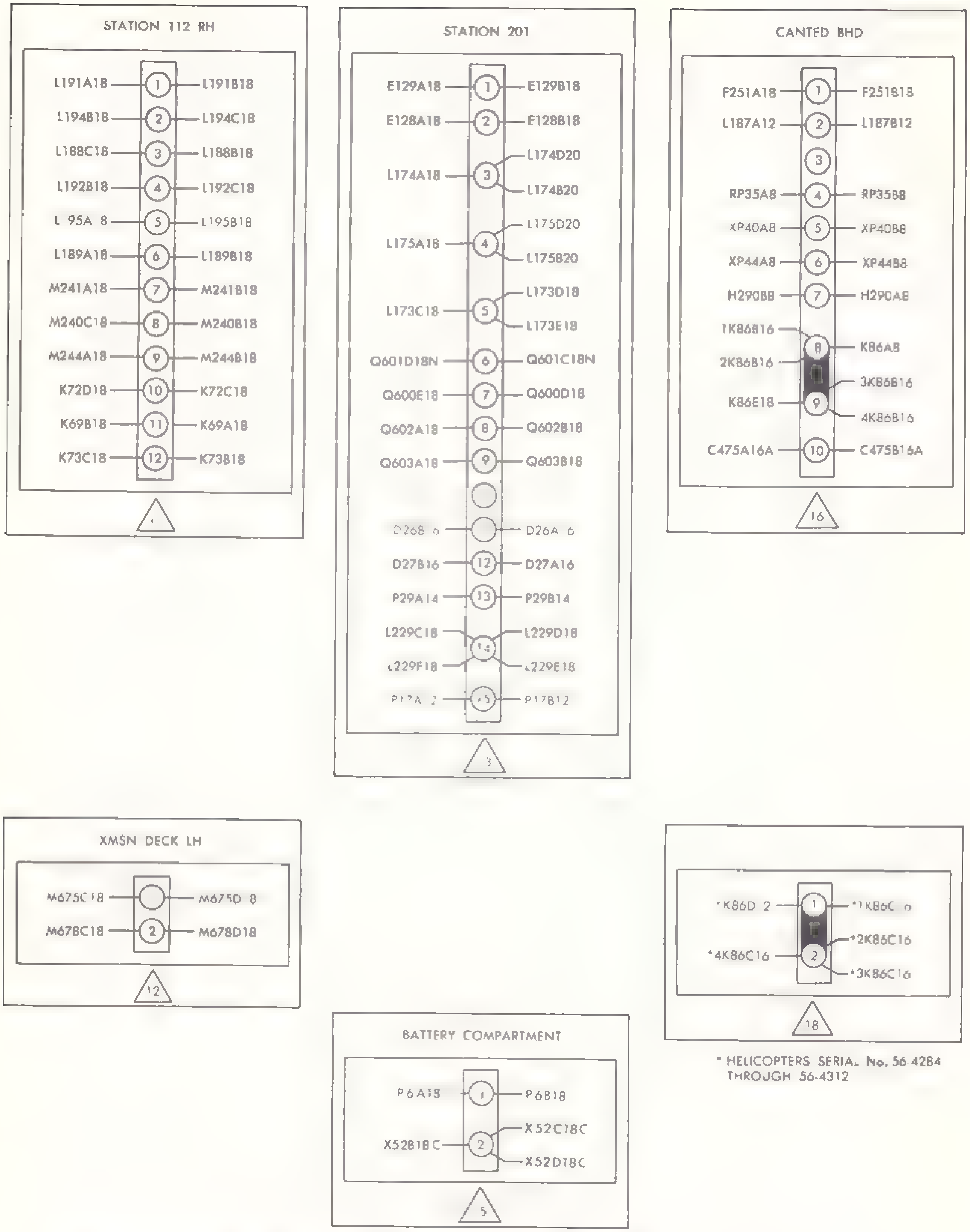


Figure 12–185. Post terminal chart – electrical (model CH-34C serial No. prior to 57-1742) (Sheet 3 of 7)

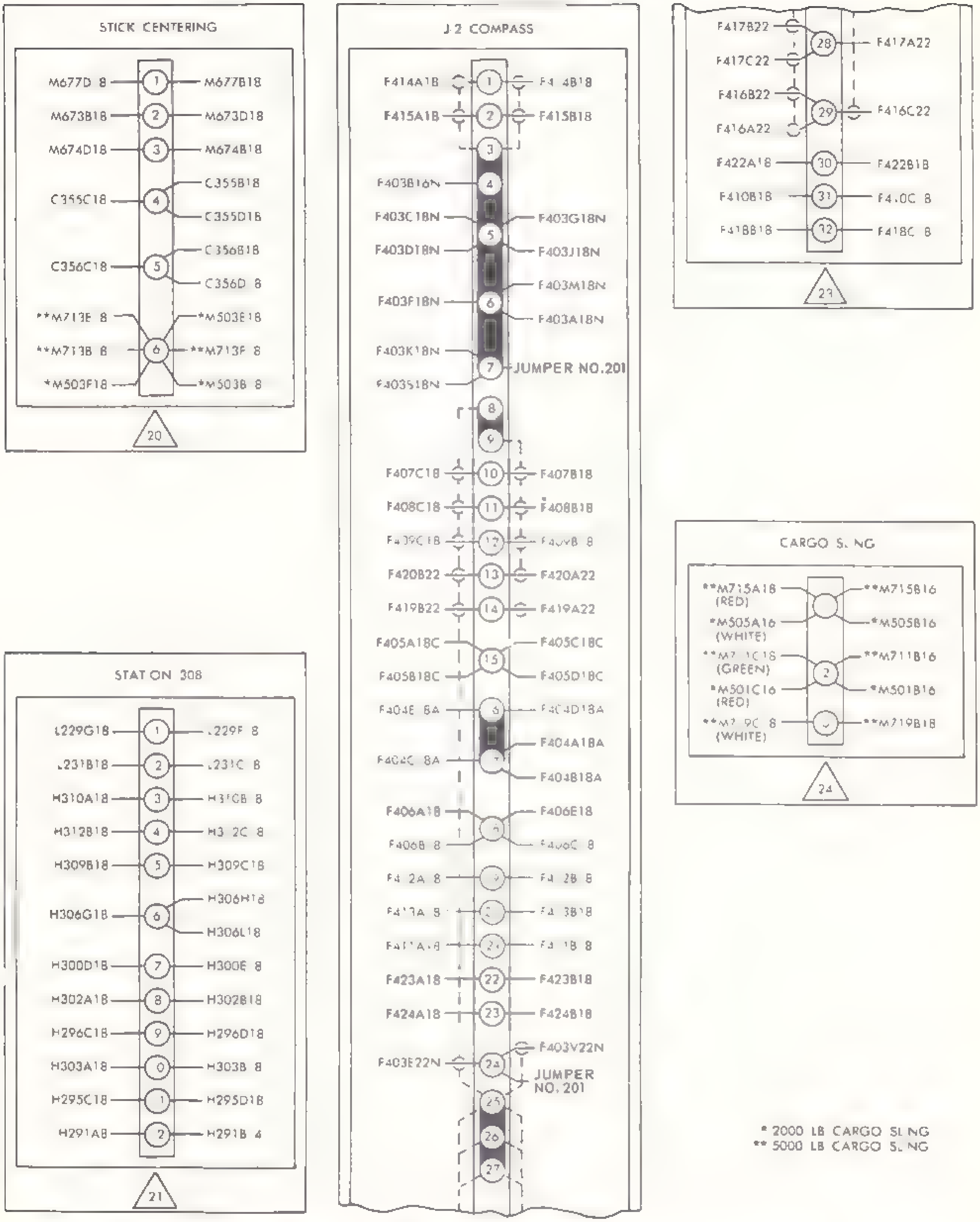


Figure 12–185. Post terminal chart – electrical (model CH-34C serial No. prior to 57-1742) (Sheet 4 of 7)

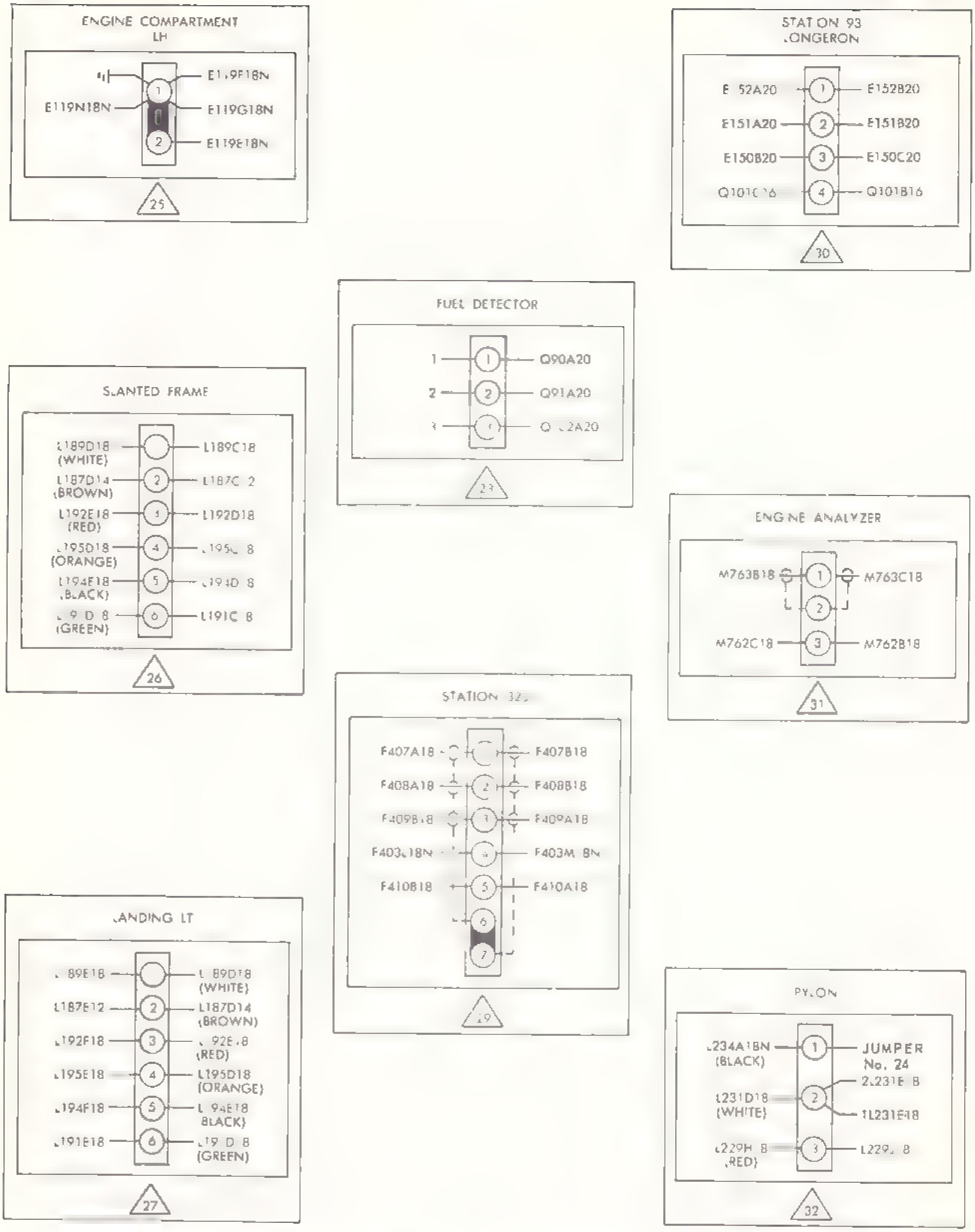
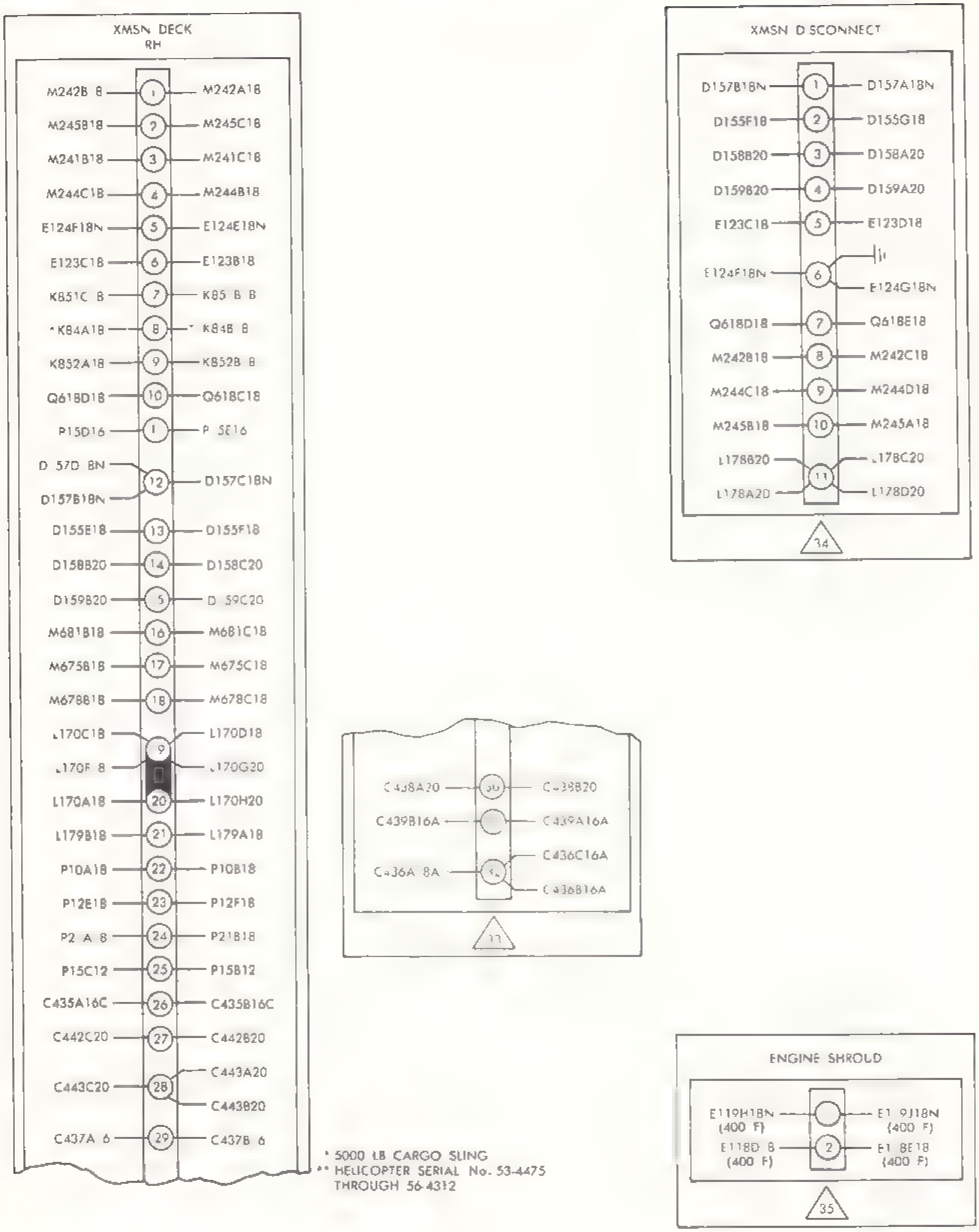


Figure 12—185. Post terminal chart — electrical (model CH-34C serial No. prior to 57-1742) (Sheet 5 of 7)



* 5000 LB CARGO SLING
** HELICOPTER SERIAL No. 53-4475 THROUGH 56-4312

Figure 12—185. Post terminal chart — electrical (model CH-34C serial No. prior to 57-1742) (Sheet 6 of 7)

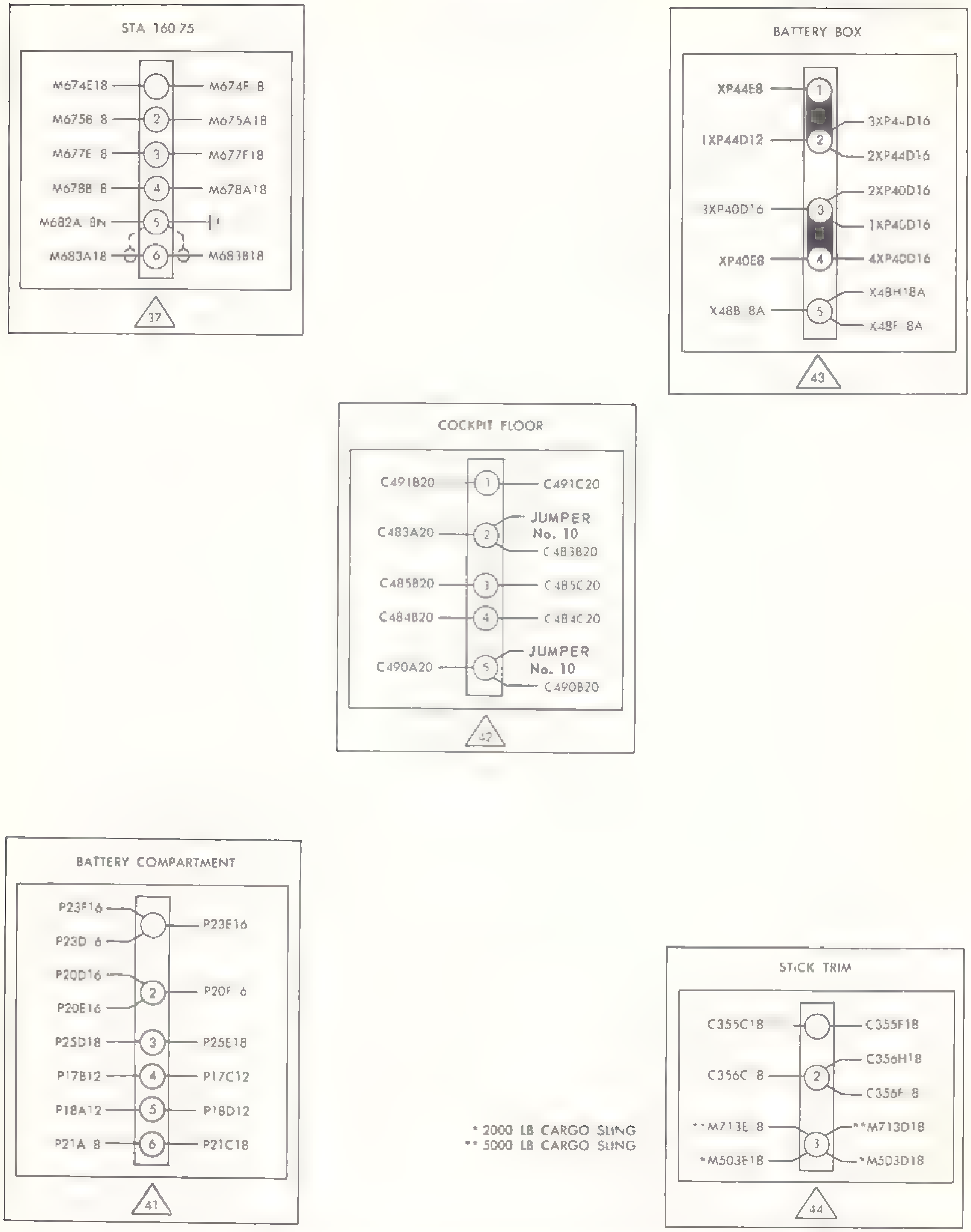


Figure 12–185. Post terminal chart – electrical (model CH-34C serial No. prior to 57-1742) (Sheet 7 of 7)

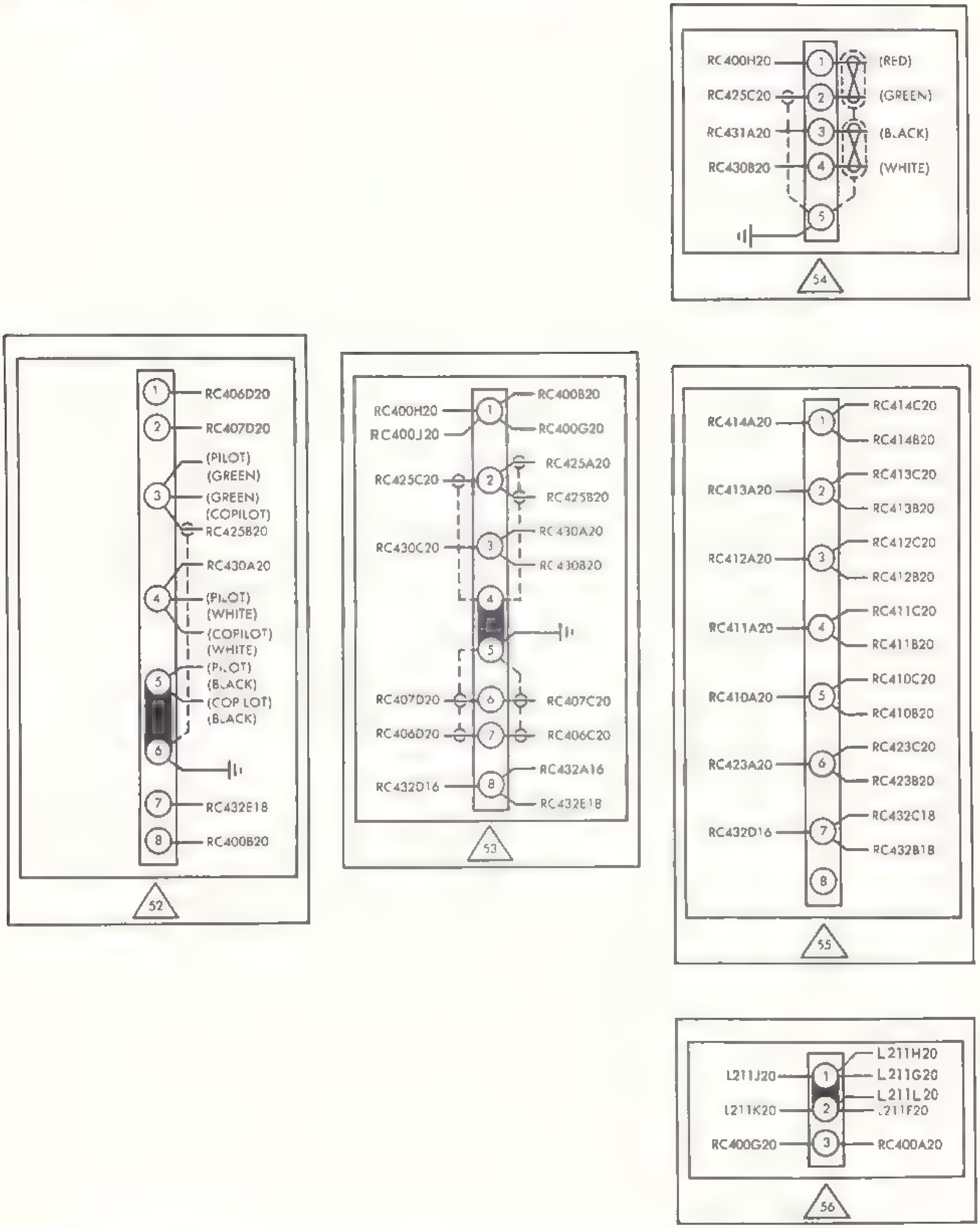


Figure 12–186. Post terminal chart – radio (model CH-34A serial No. prior to 54-882)

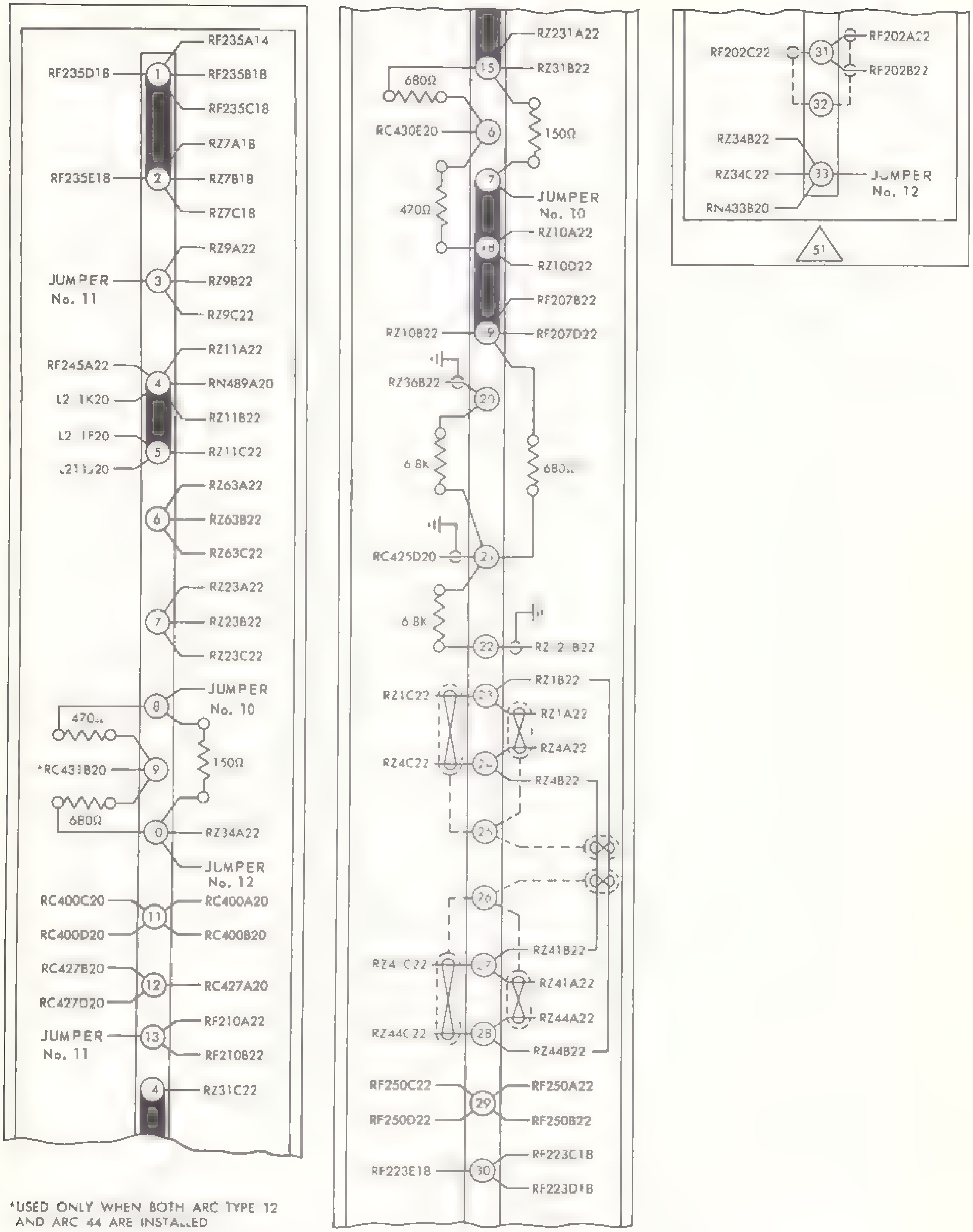


Figure 12–187. Post terminal chart – radio (model CH-34A serial No. 54 882 through 56-4504) (Sheet 1 of 3)

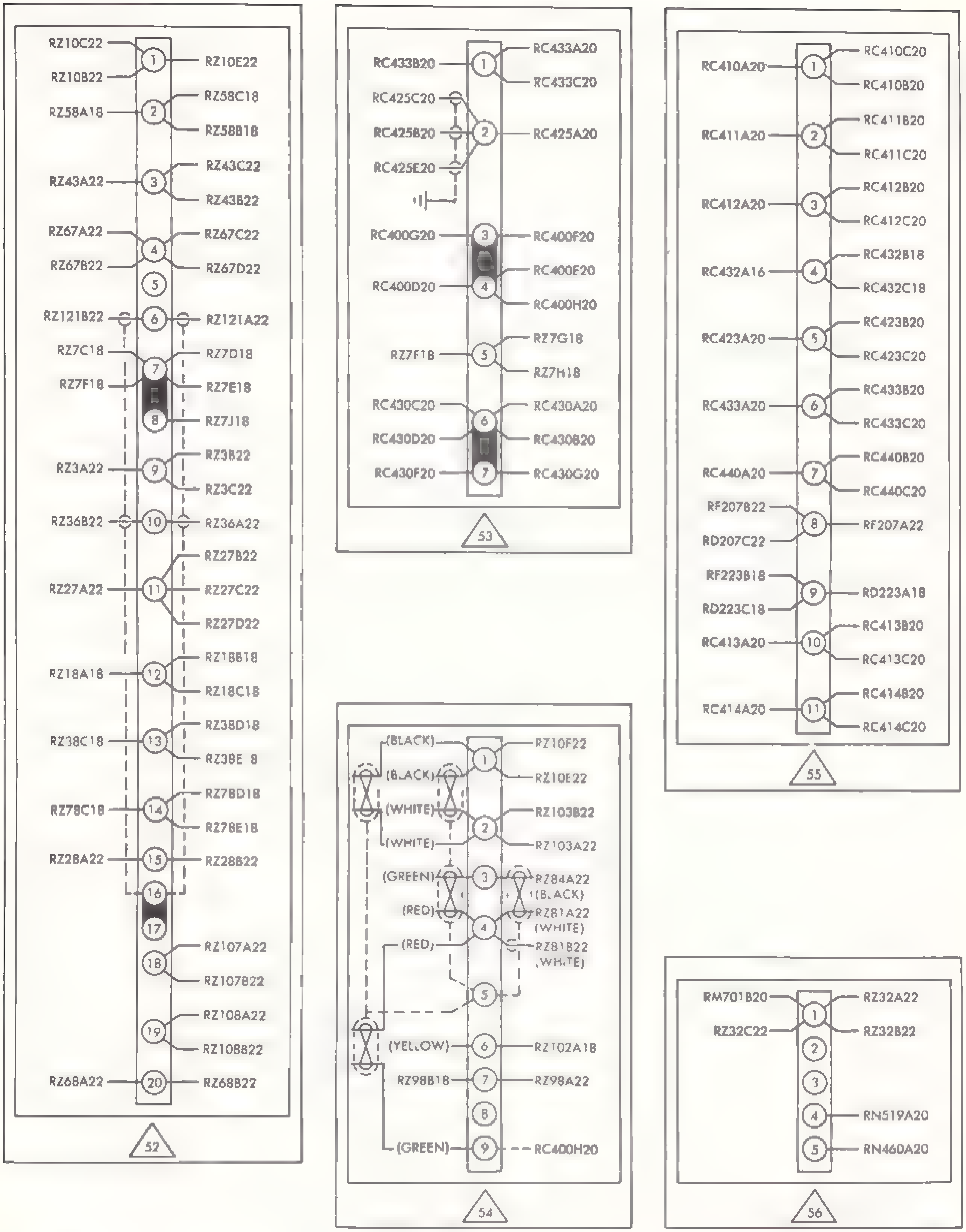
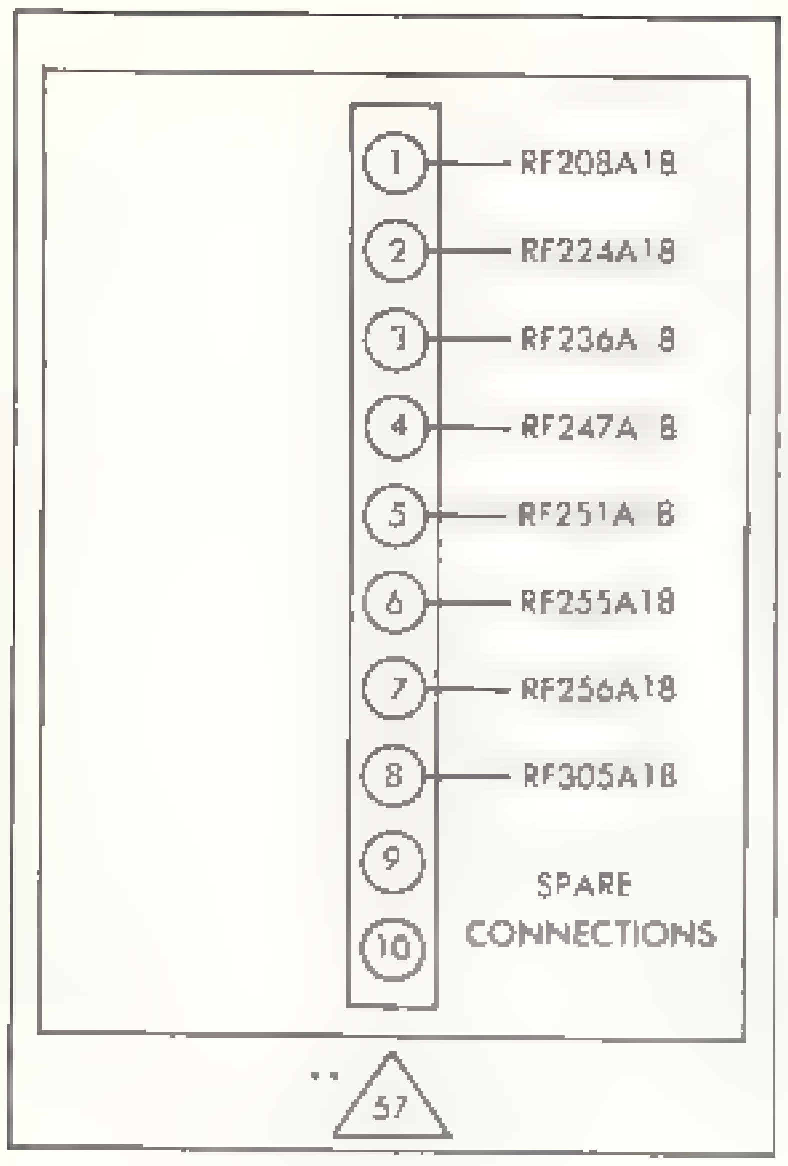
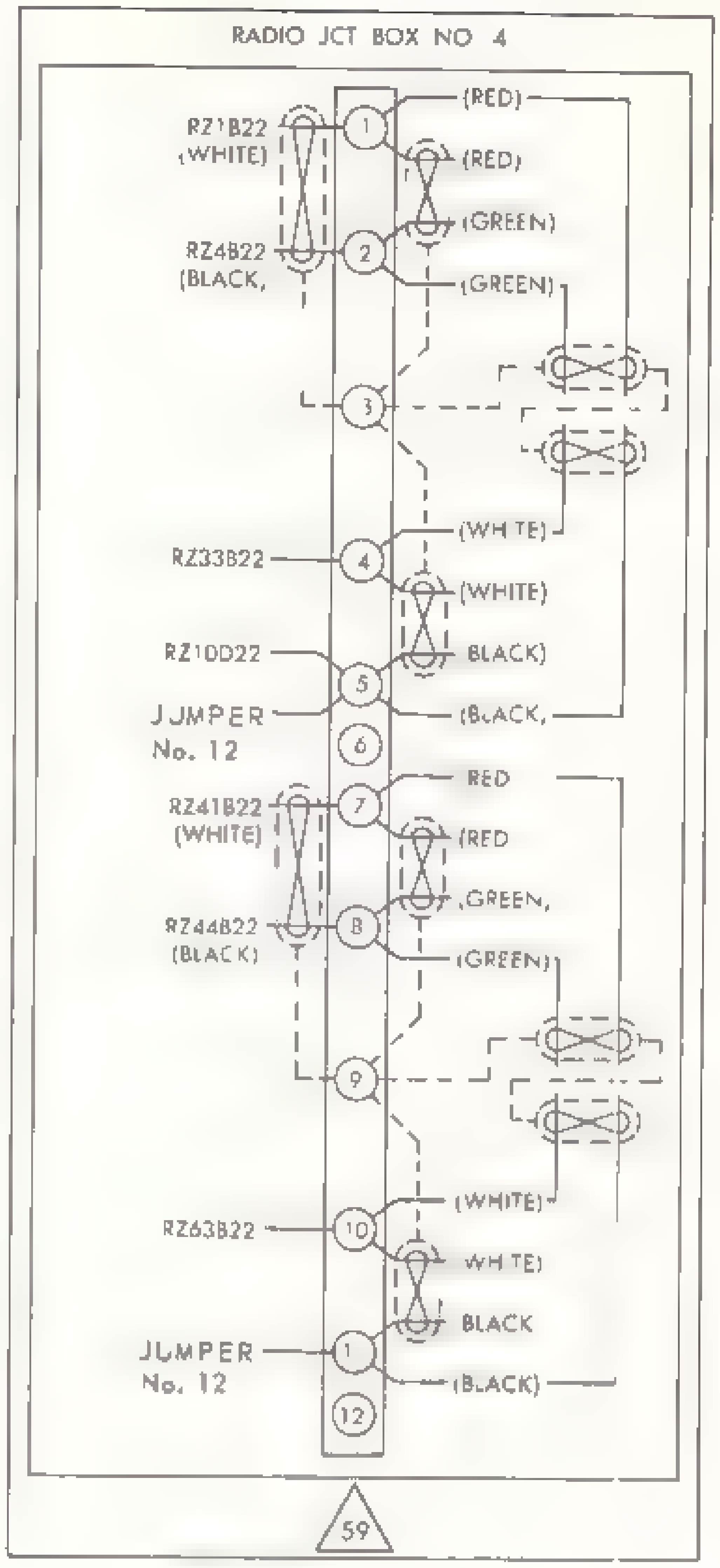
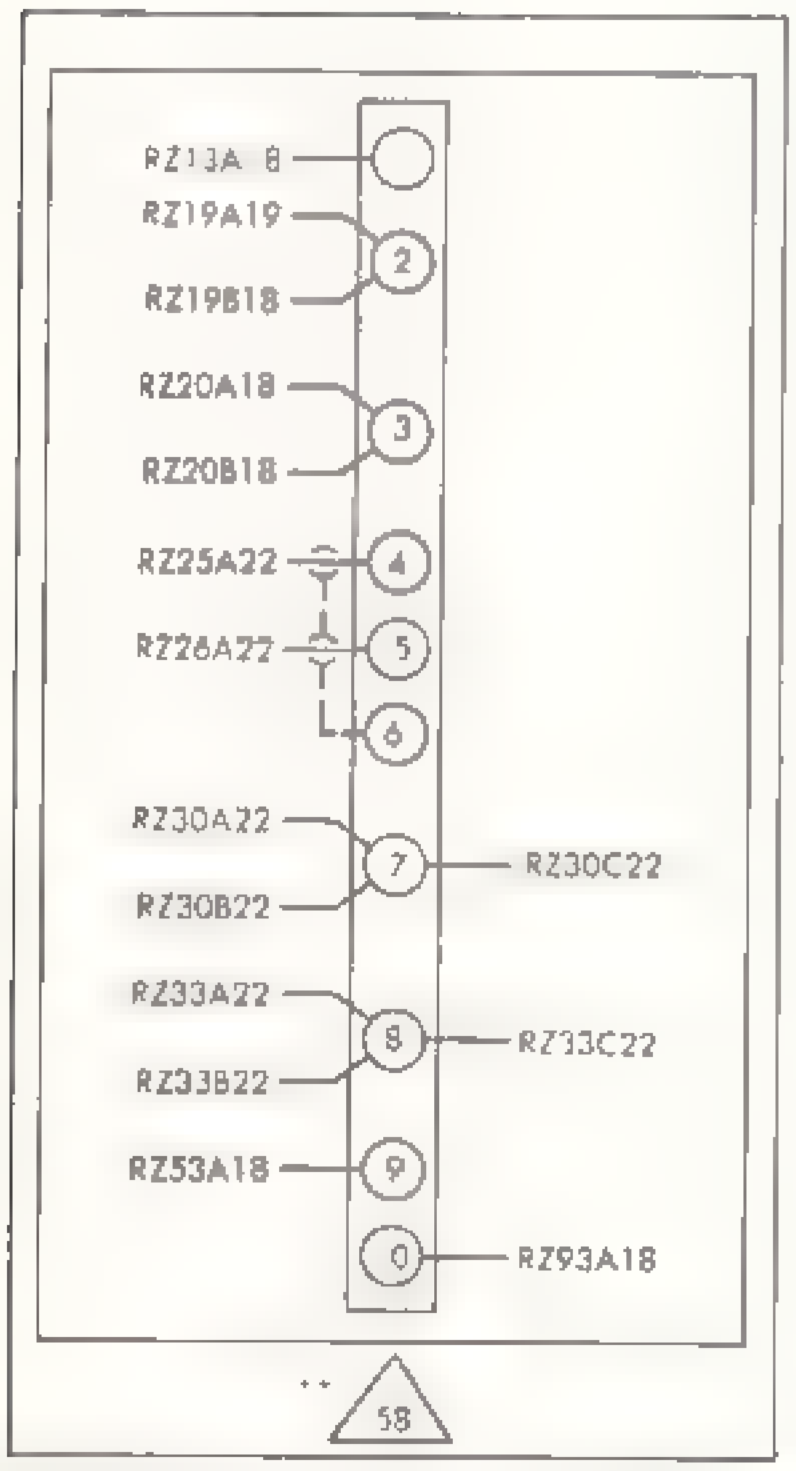


Figure 12–187. Post terminal chart – radio (model CH-34A serial No. 54-882 through 56-4504) (Sheet 2 of 3)







**HELICOPTERS SERIAL No. 55-4489 AND SUBSEQUENT

Figure 12–187. Post terminal chart – radio (model CH-34A serial No. 54-882 through 56-4504) (Sheet 3 of 3)

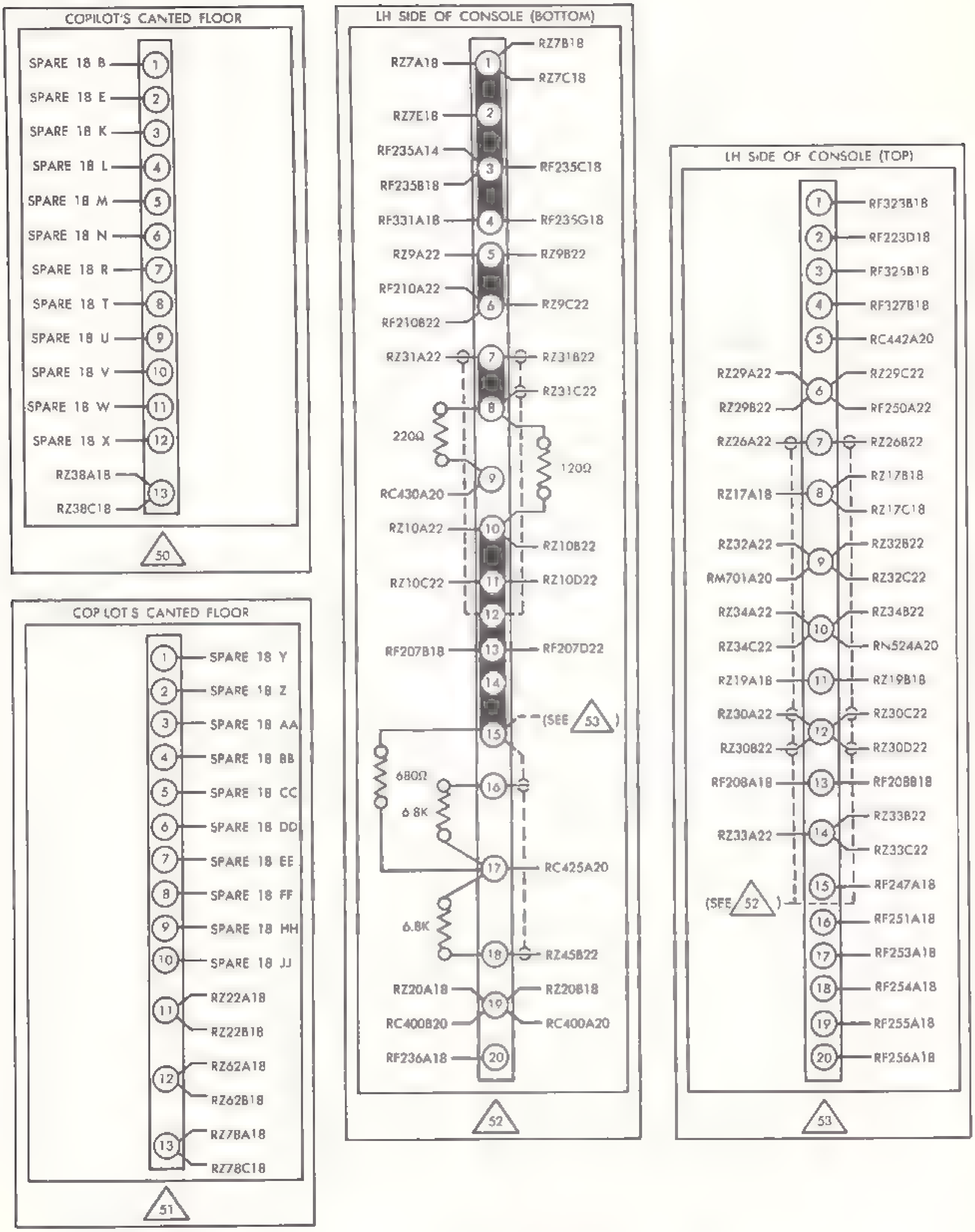


Figure 12—188 Post terminal chart — radio (model CH-34A serial No. 56-4284 through 56-4313) (Sheet 1 of 3)

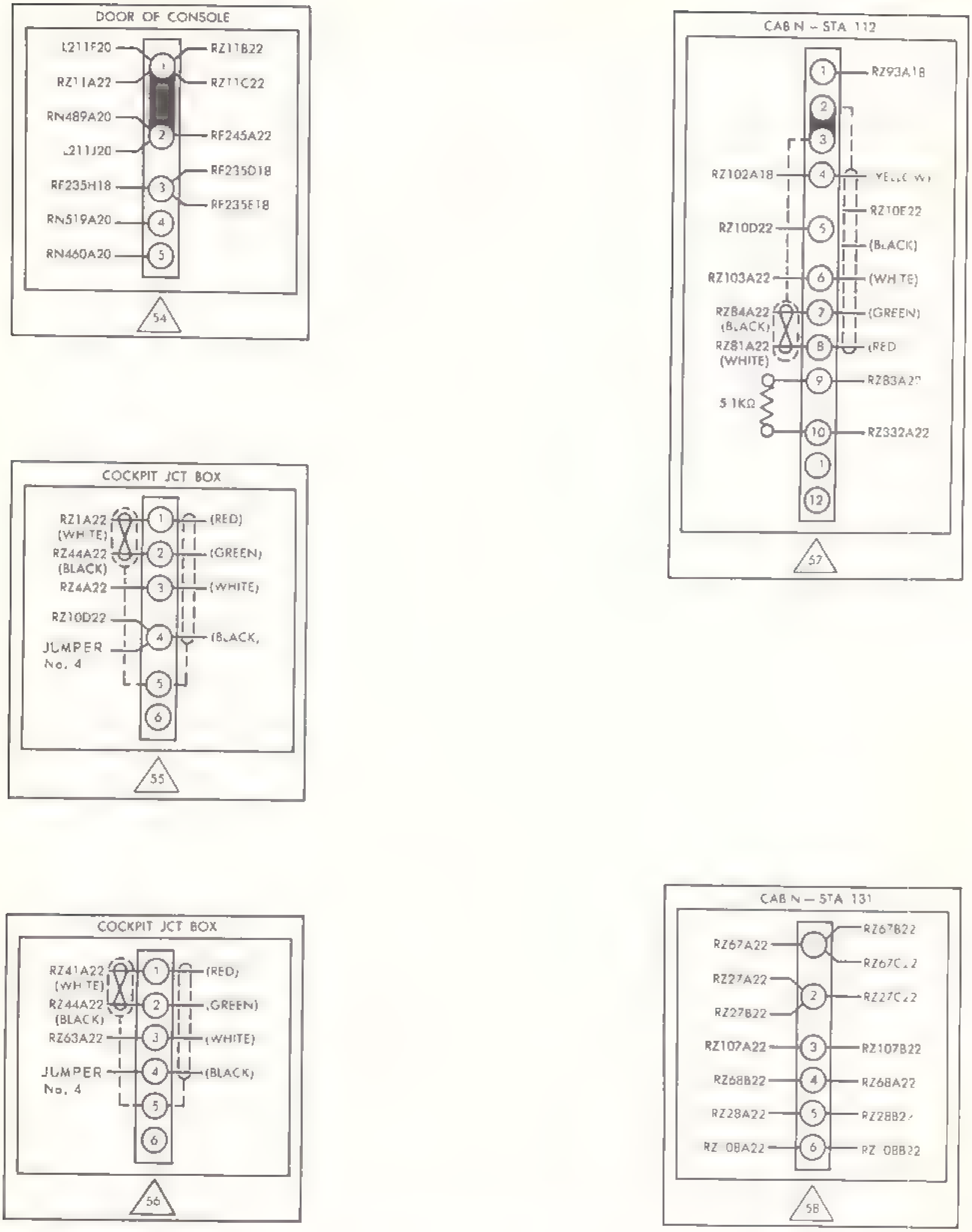
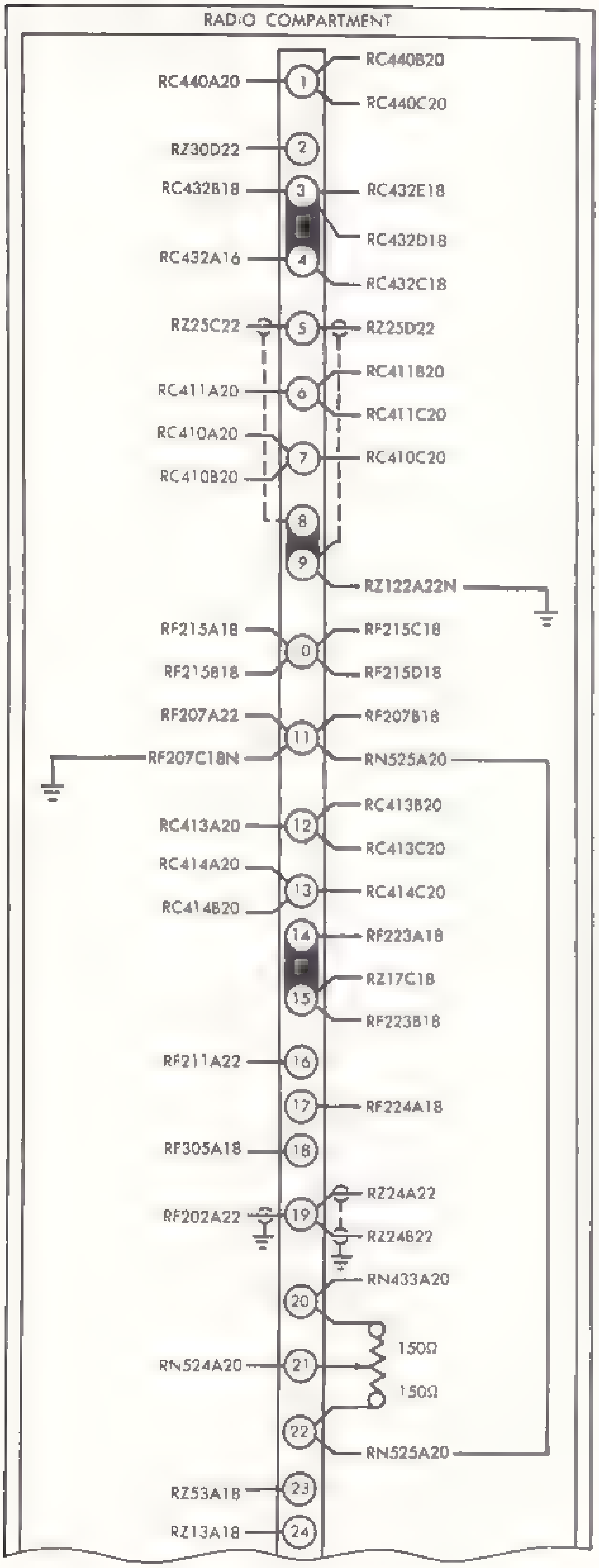


Figure 12–188. Post terminal chart – radio (model CH-34A serial No. 56 4284 through 56 4313) (Sheet 2 of 3)



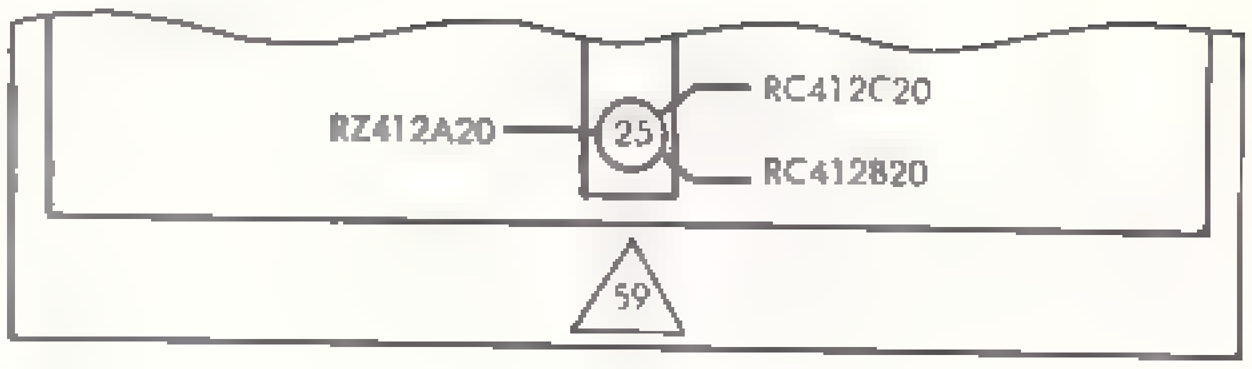


Figure 12—188. Post terminal chart — radio (model CH-34A serial No. 56-4284 through 56-4313) (Sheet 3 of 3)

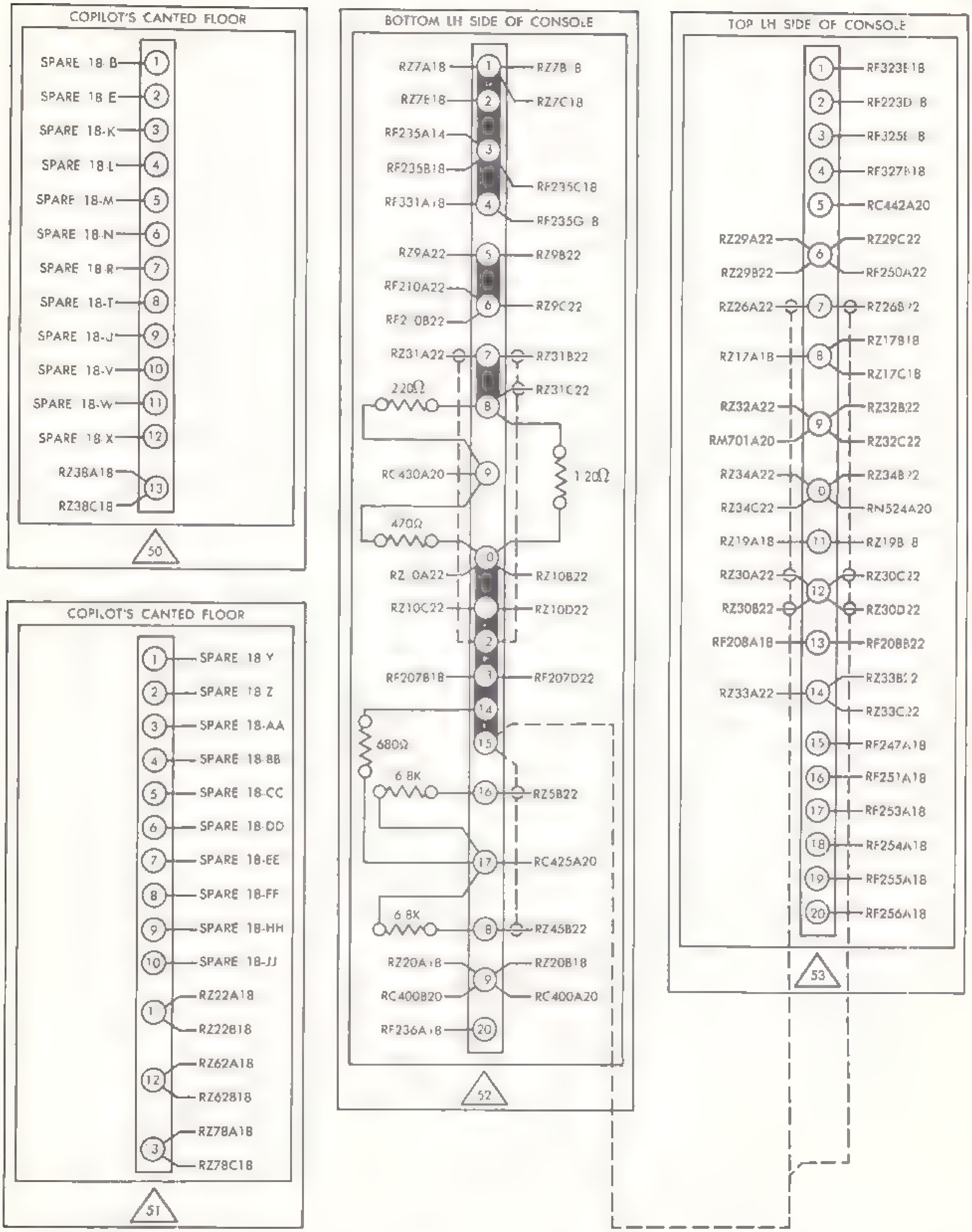


Figure 12–189. Post terminal chart – radio (model CH-34A serial No. 56-4314, 56-4317 through 56-4319, and 56-4321 through 56-4342) (Sheet 1 of 2)

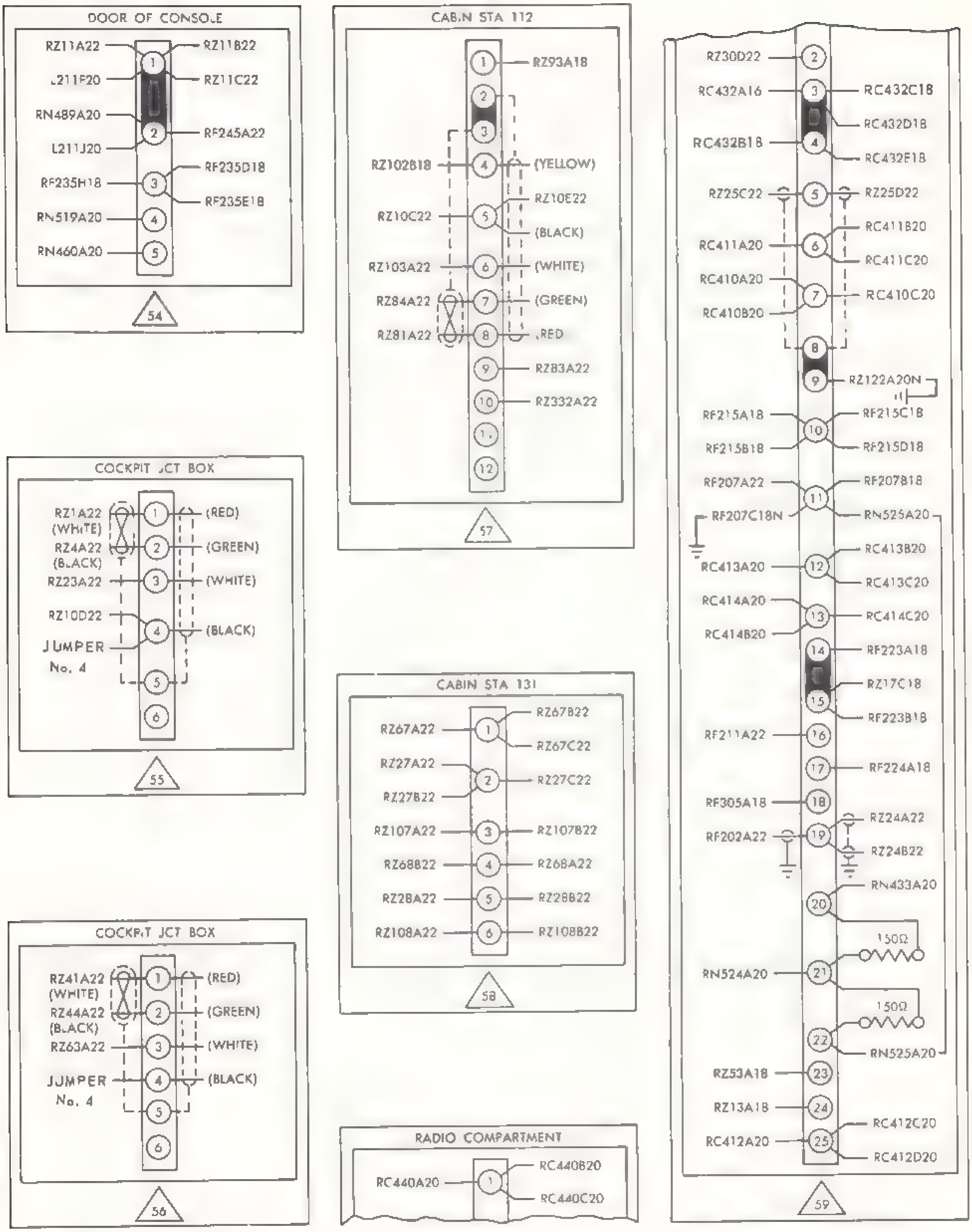


Figure 12–189. Post terminal chart – radio (model CH-34A serial No. 56-4314, 56-4317 through 56-4319, and 56-4321 through 56-4342) (Sheet 2 of 2)

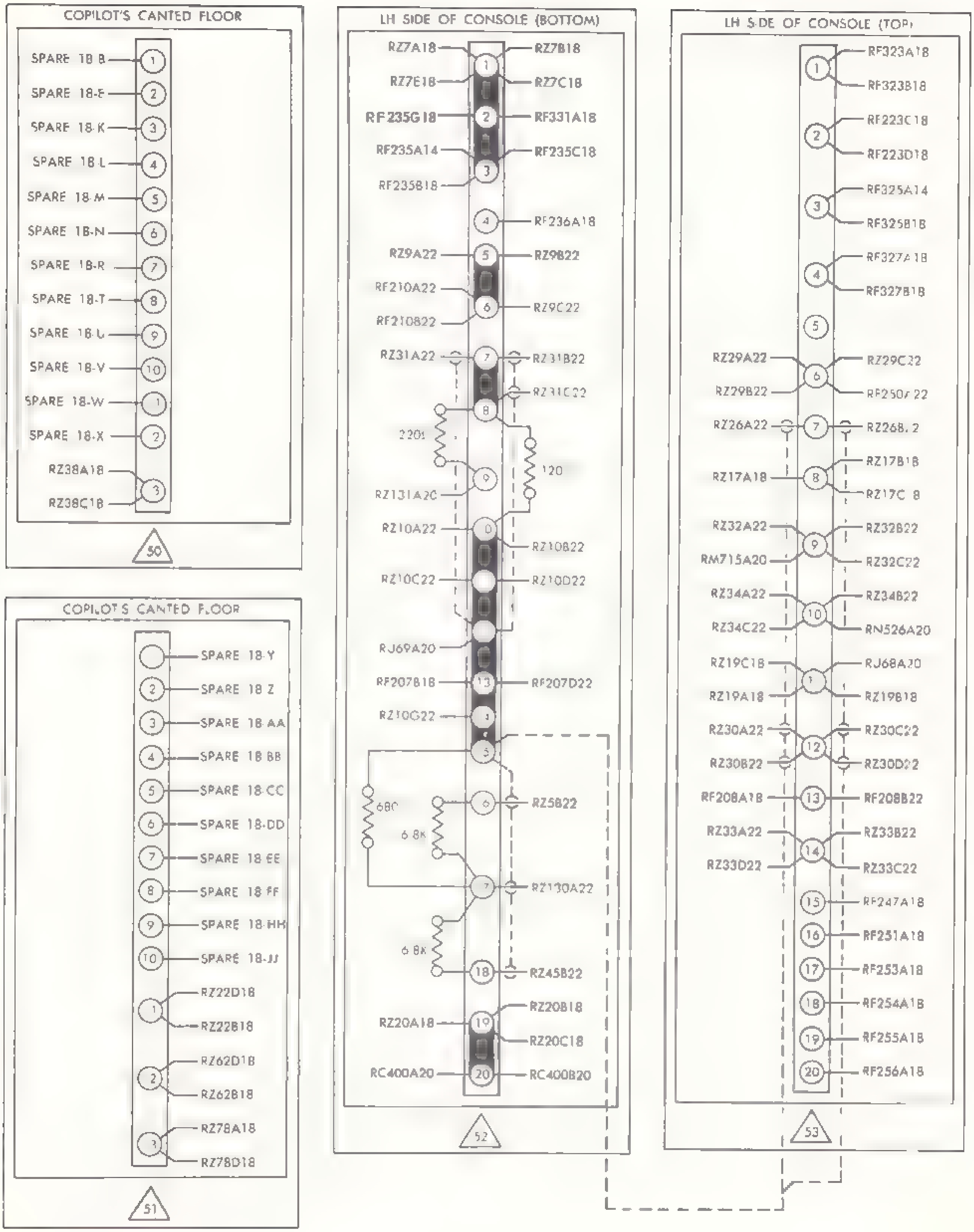


Figure 12–190. Post terminal chart – radio (model CH-34A serial No. 57-1691 through 57-1725) (Sheet 1 of 4)

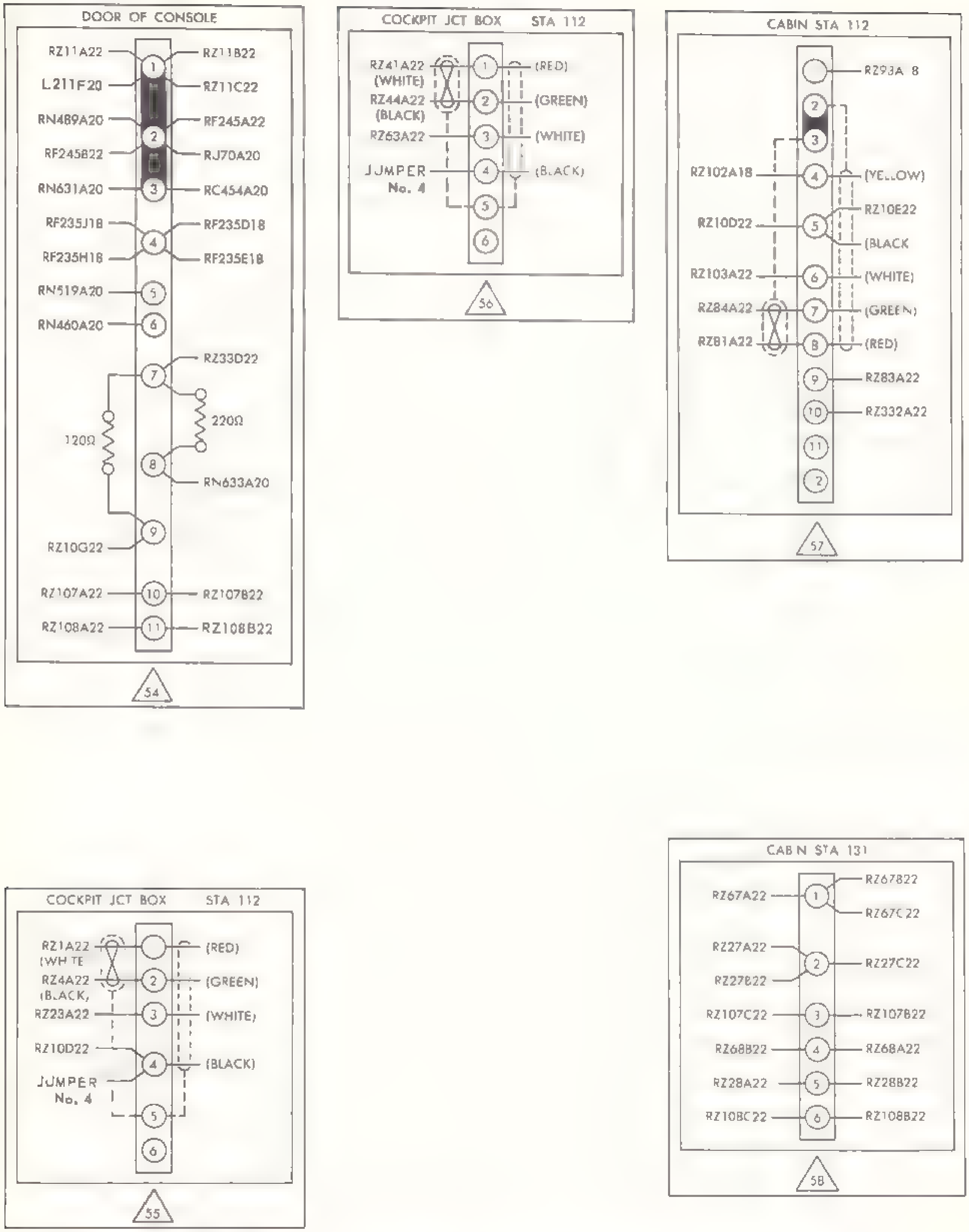
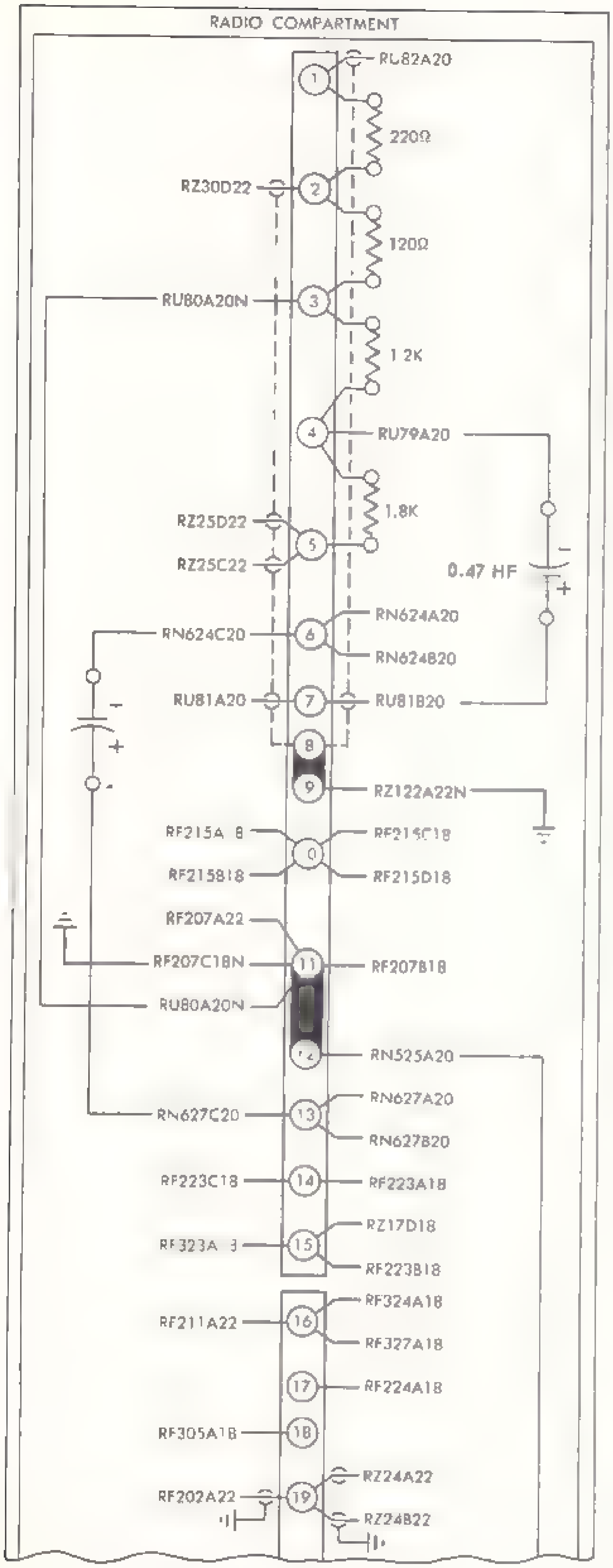


Figure 12–190. Post terminal chart – radio (model CH-34A serial No. 57-1691 through 57-1725) (Sheet 2 of 4)



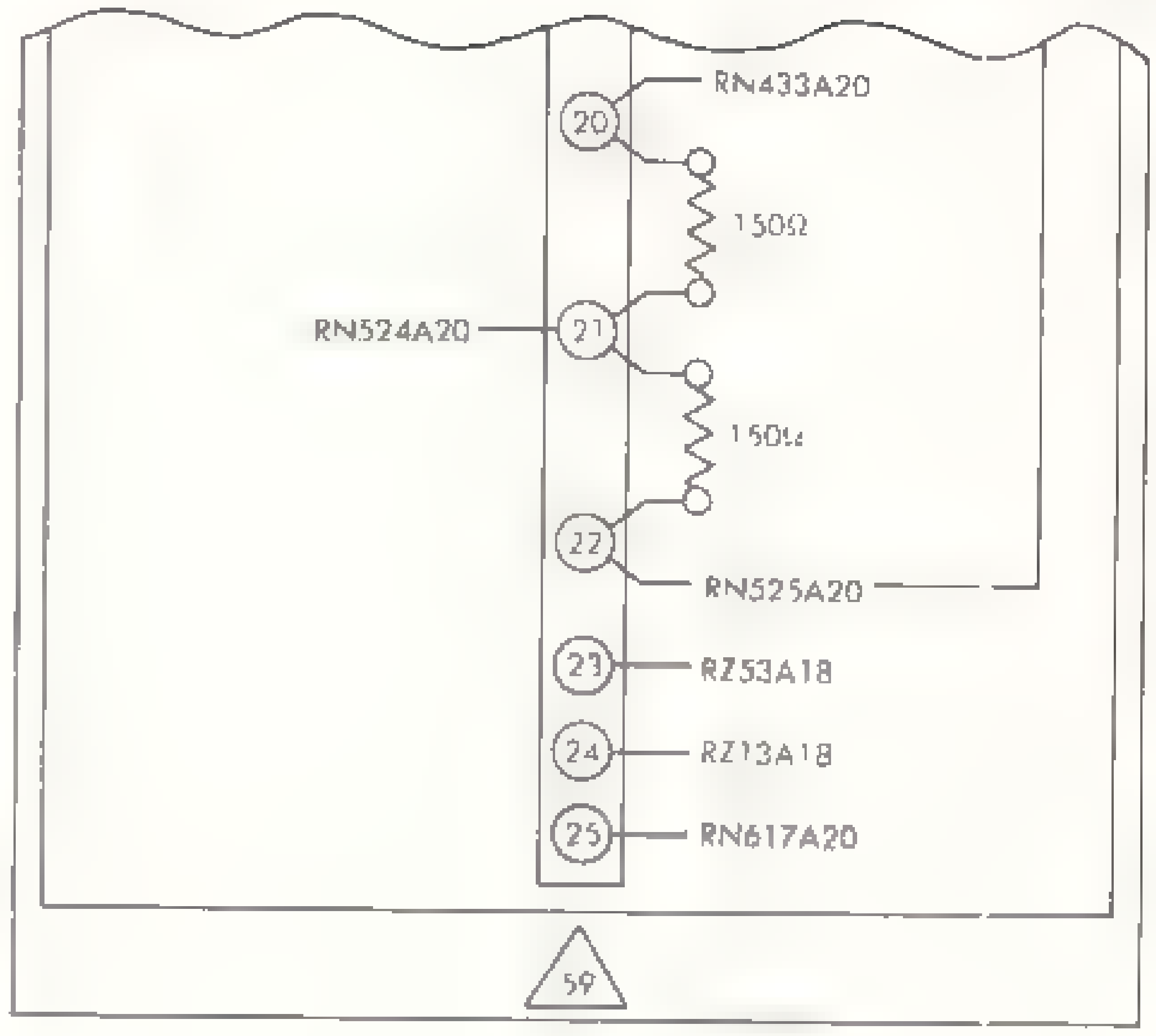
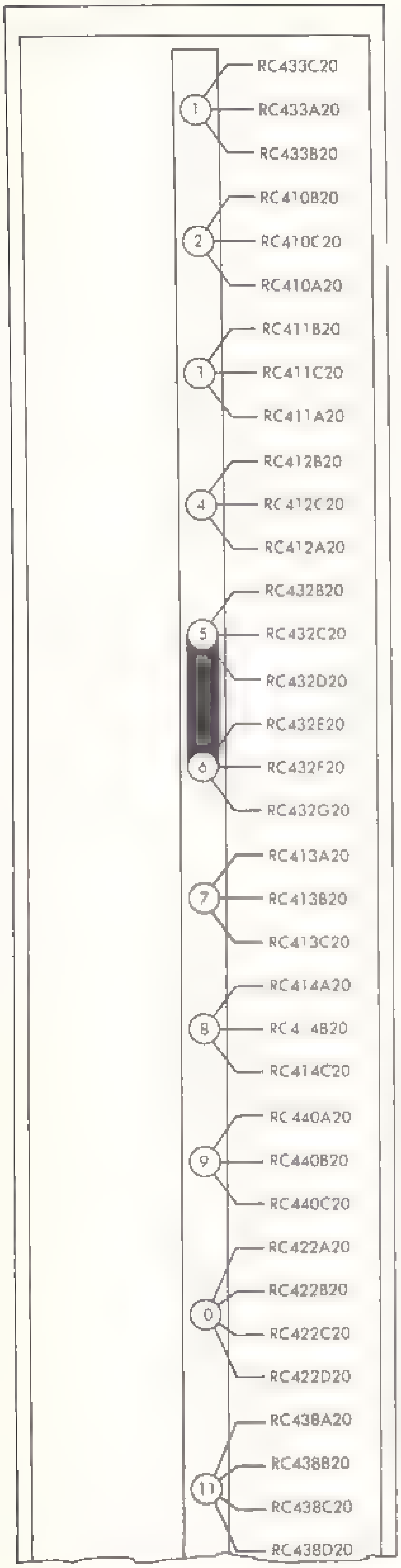
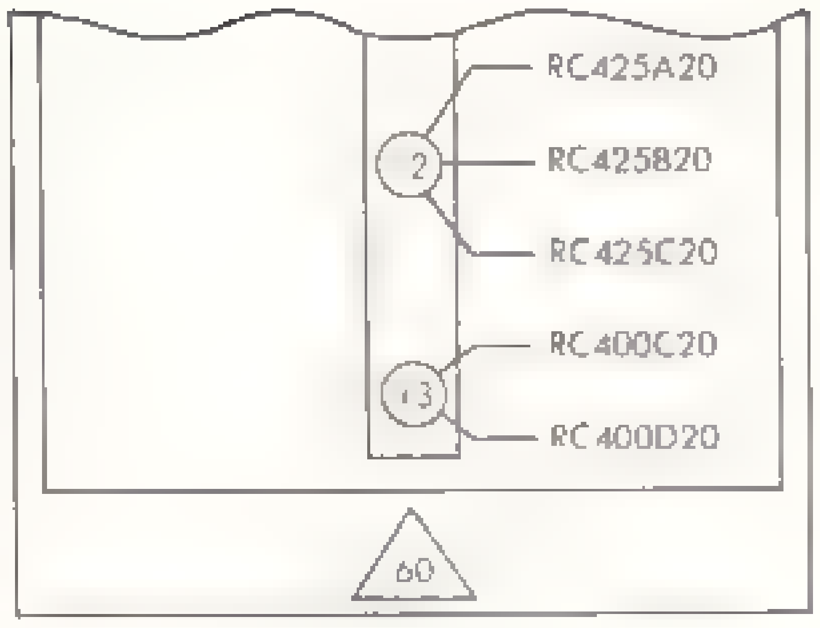


Figure 12–190. Post terminal chart – radio (model CH-34A serial No. 57-1691 through 57-1725) (Sheet 3 of 4)





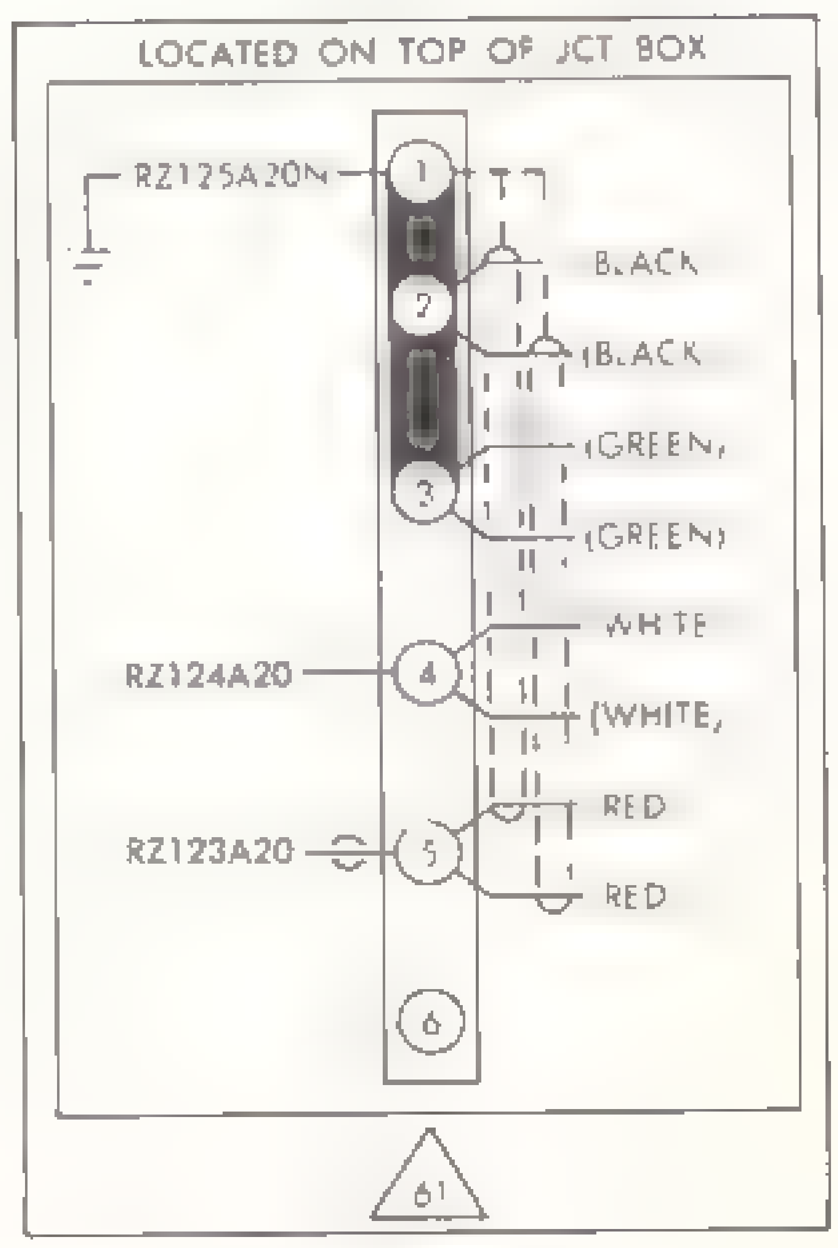


Figure 12–190. Post terminal chart – radio (model CH-34A serial No. 57 1691 through 57-1725) (Sheet 4 of 4)

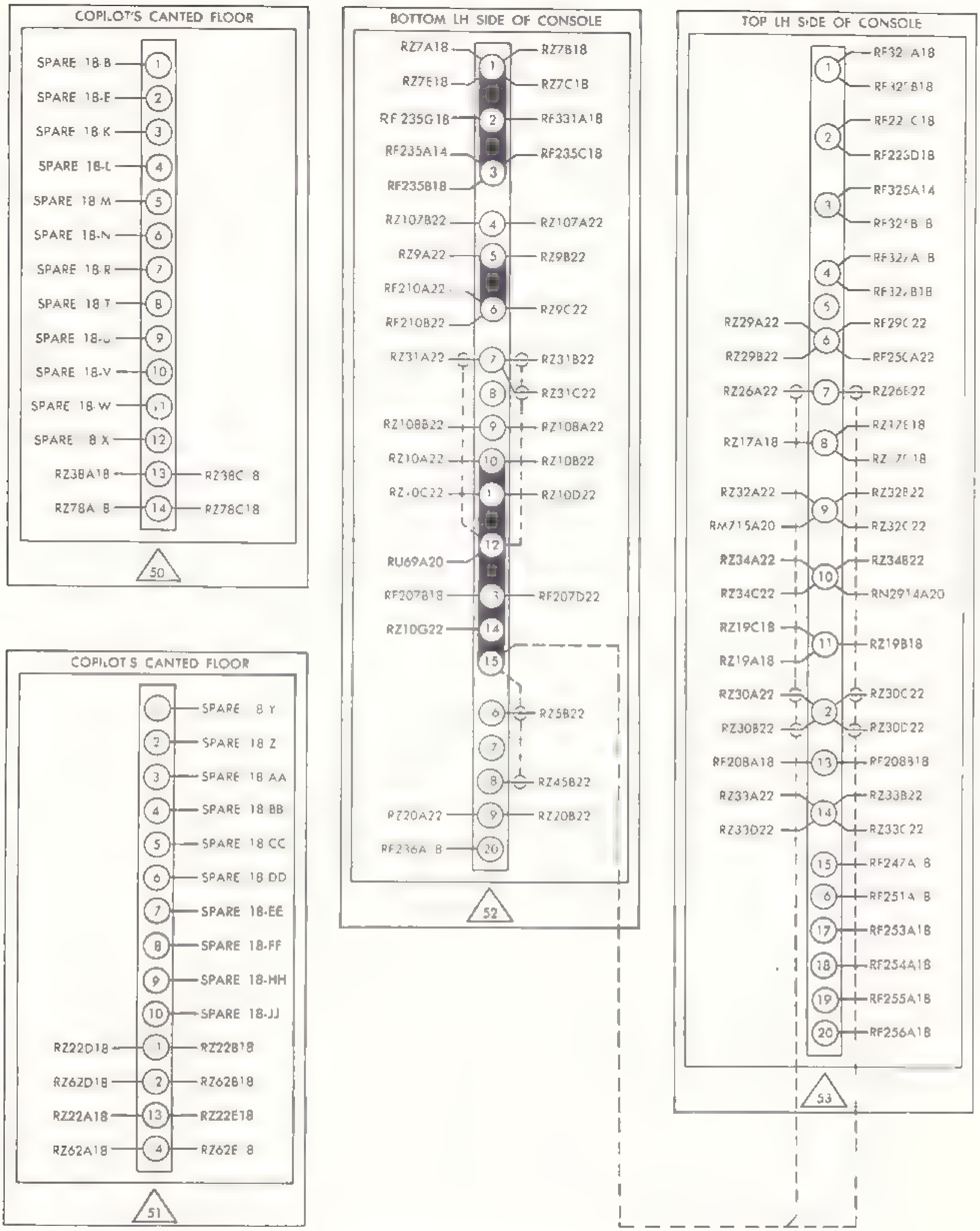


Figure 12—191. Post terminal chart — radio (model CH-34A serial No. 57-1685 through 57-1690) (Sheet 1 of 3)

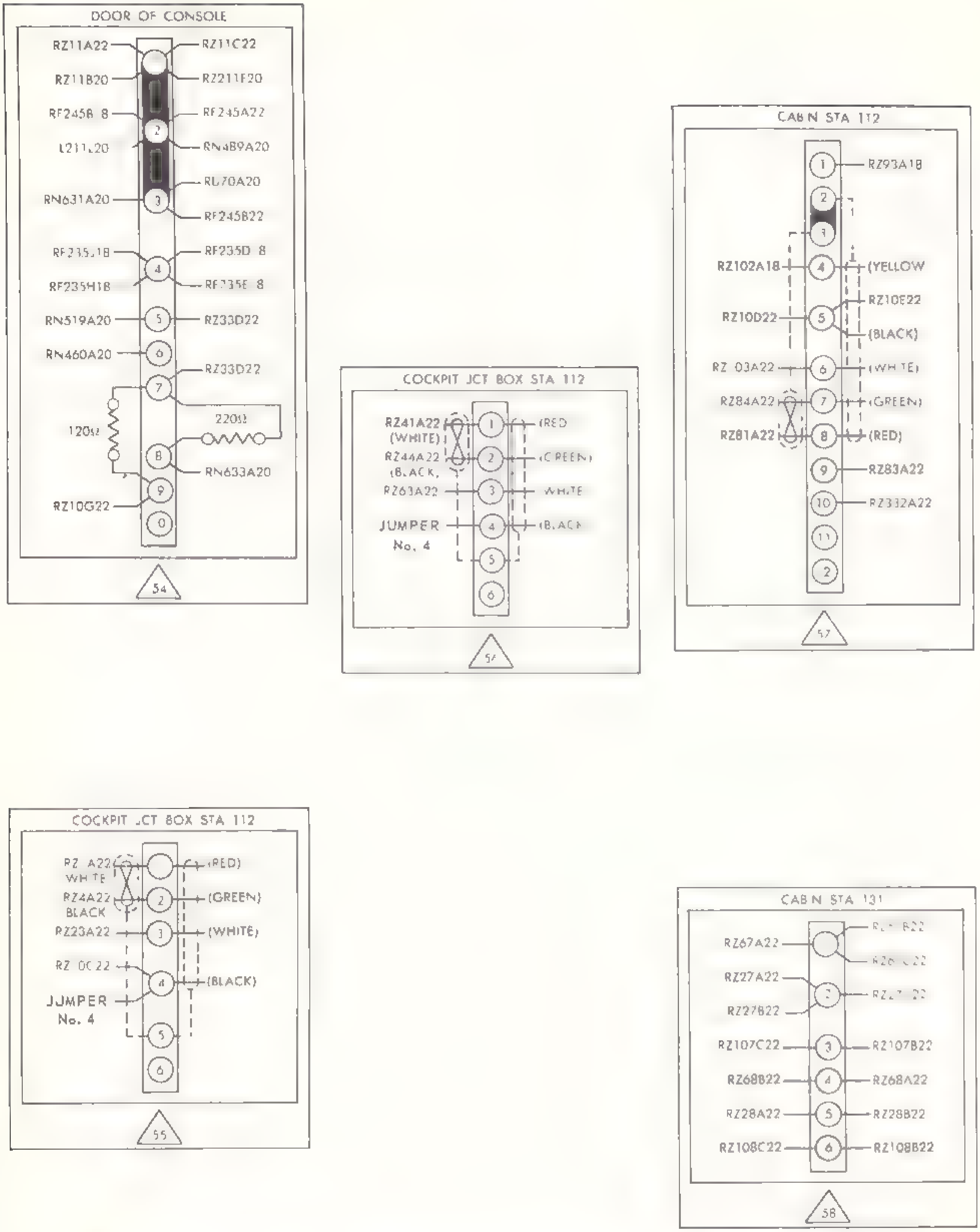


Figure 12–191. Post terminal chart — radio (model CH-34A serial No. 57-1685 through 57-1690) (Sheet 2 of 3)

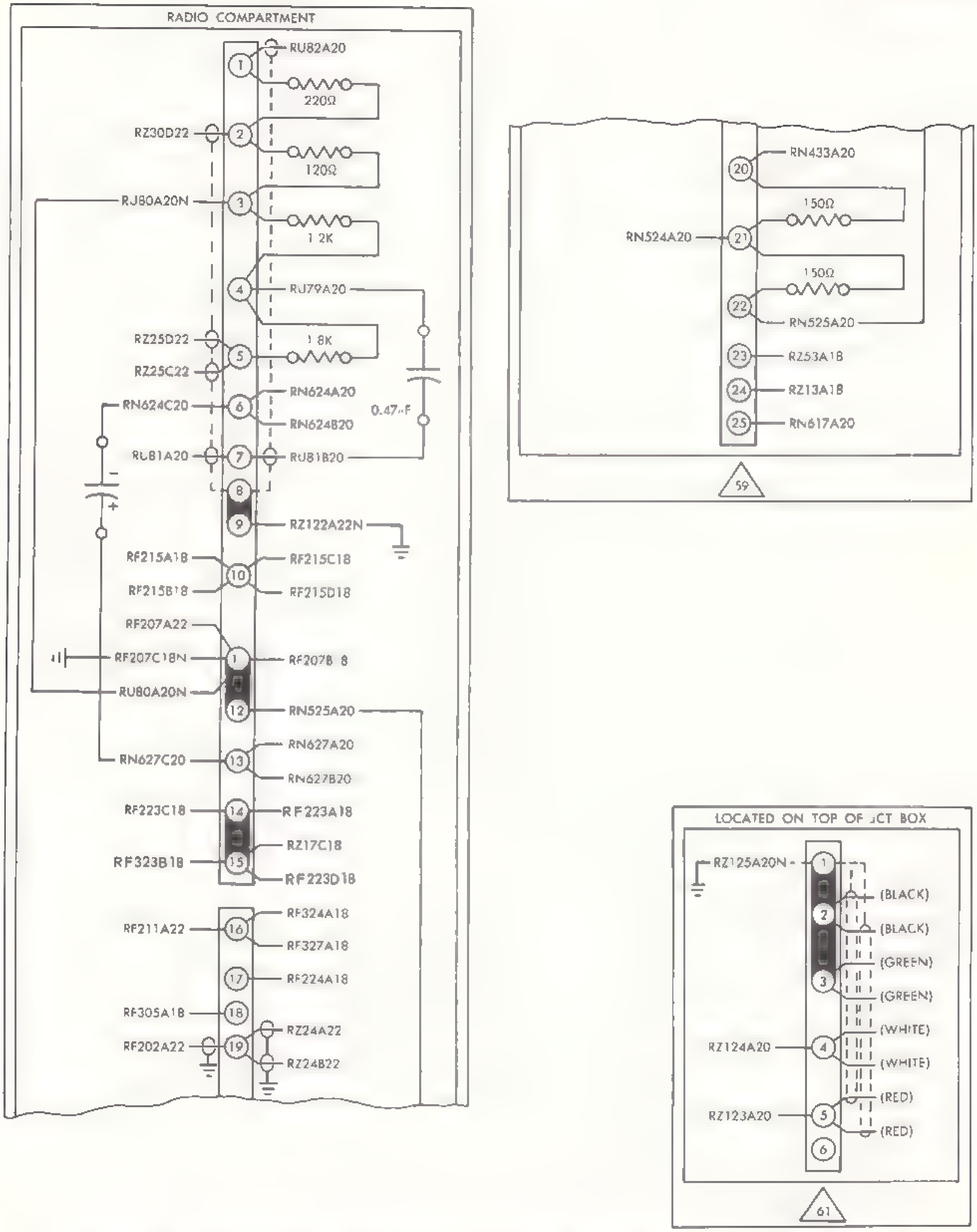
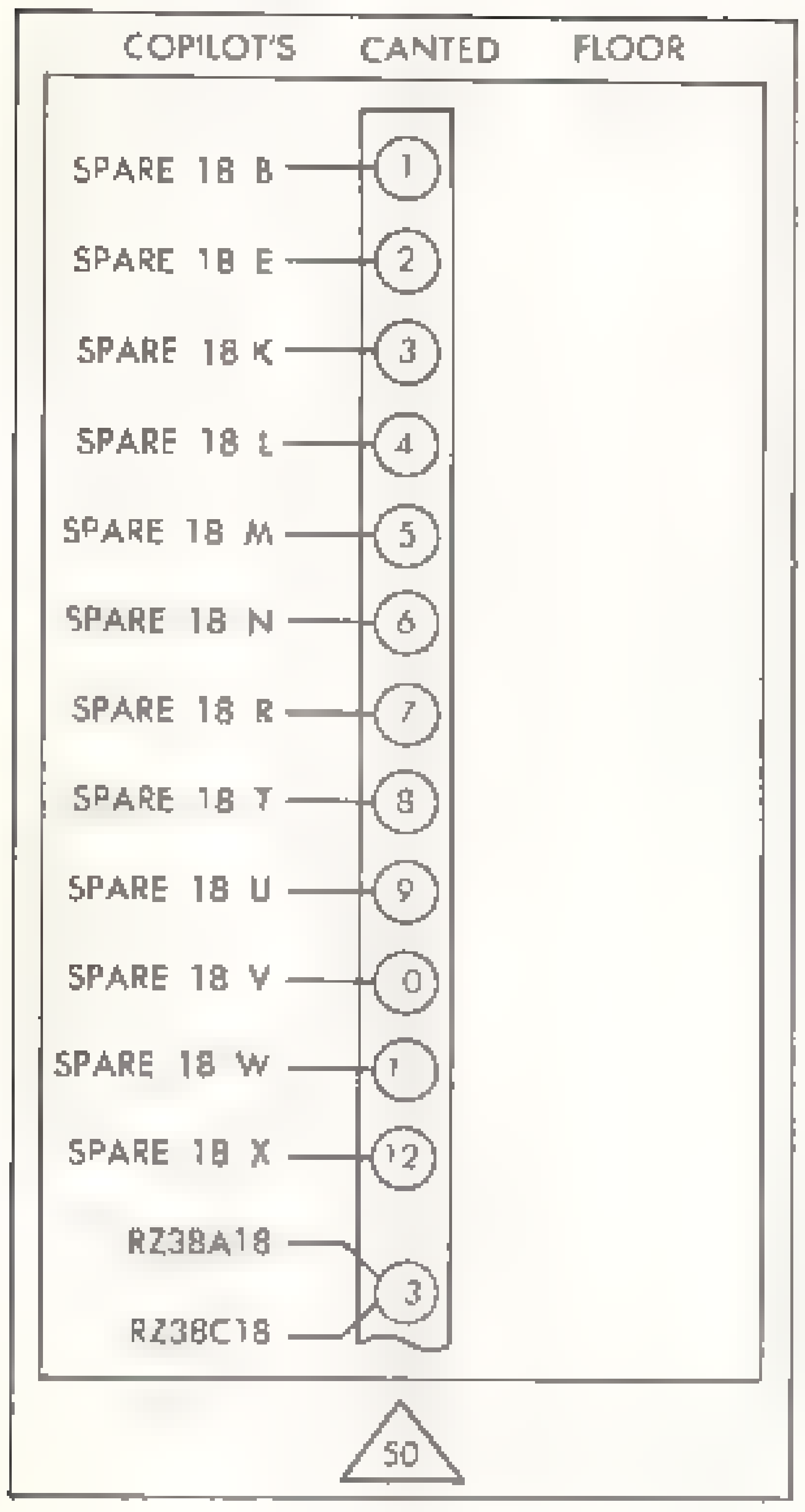


Figure 12–191. Post terminal chart – radio (model CH-34A serial No. 57-1685 through 57-1690) (Sheet 3 of 3)



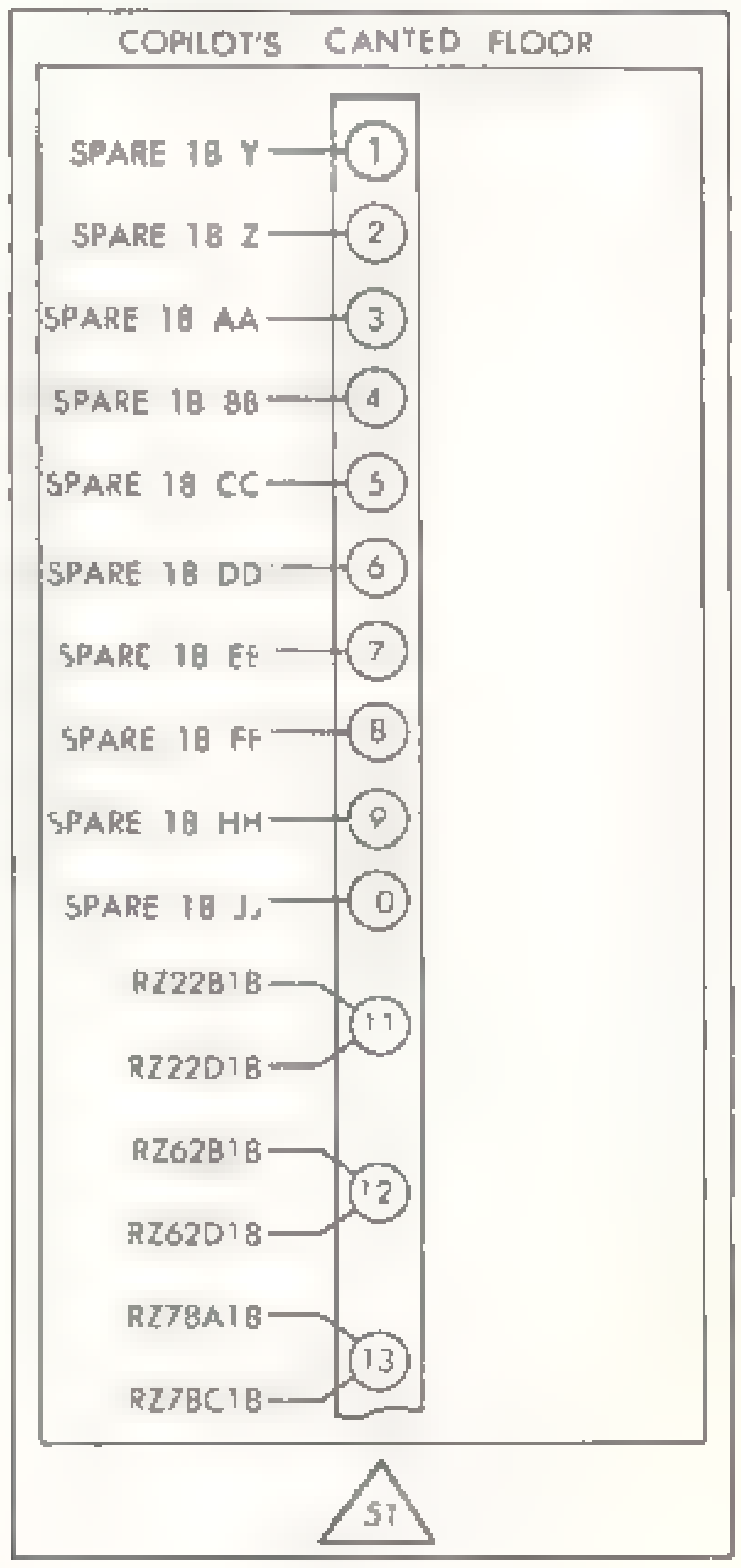


Figure 12—192. Post terminal chart — radio (model CH-34A serial No. 57-1726 through 57-1740) (Sheet 1 of 5)

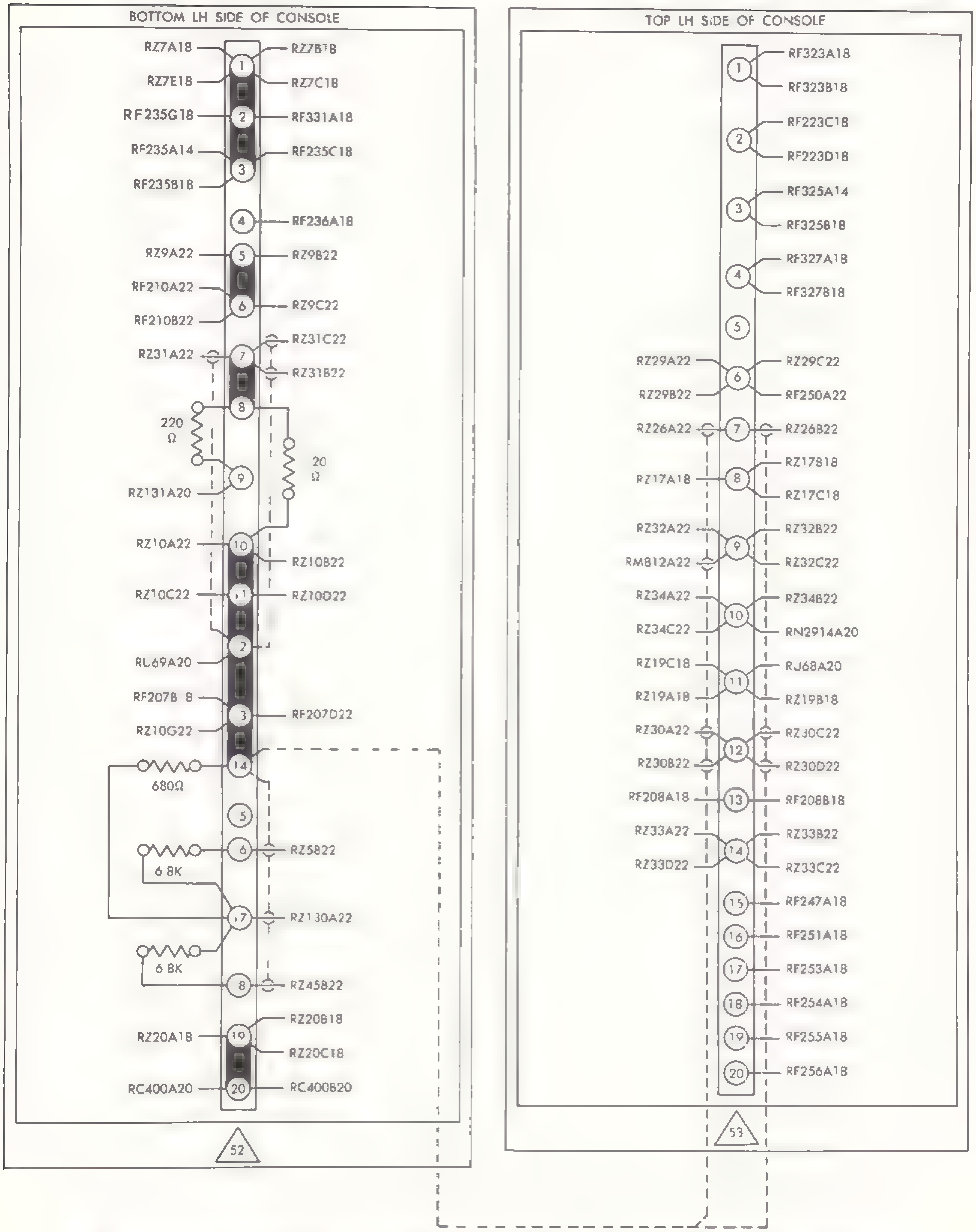
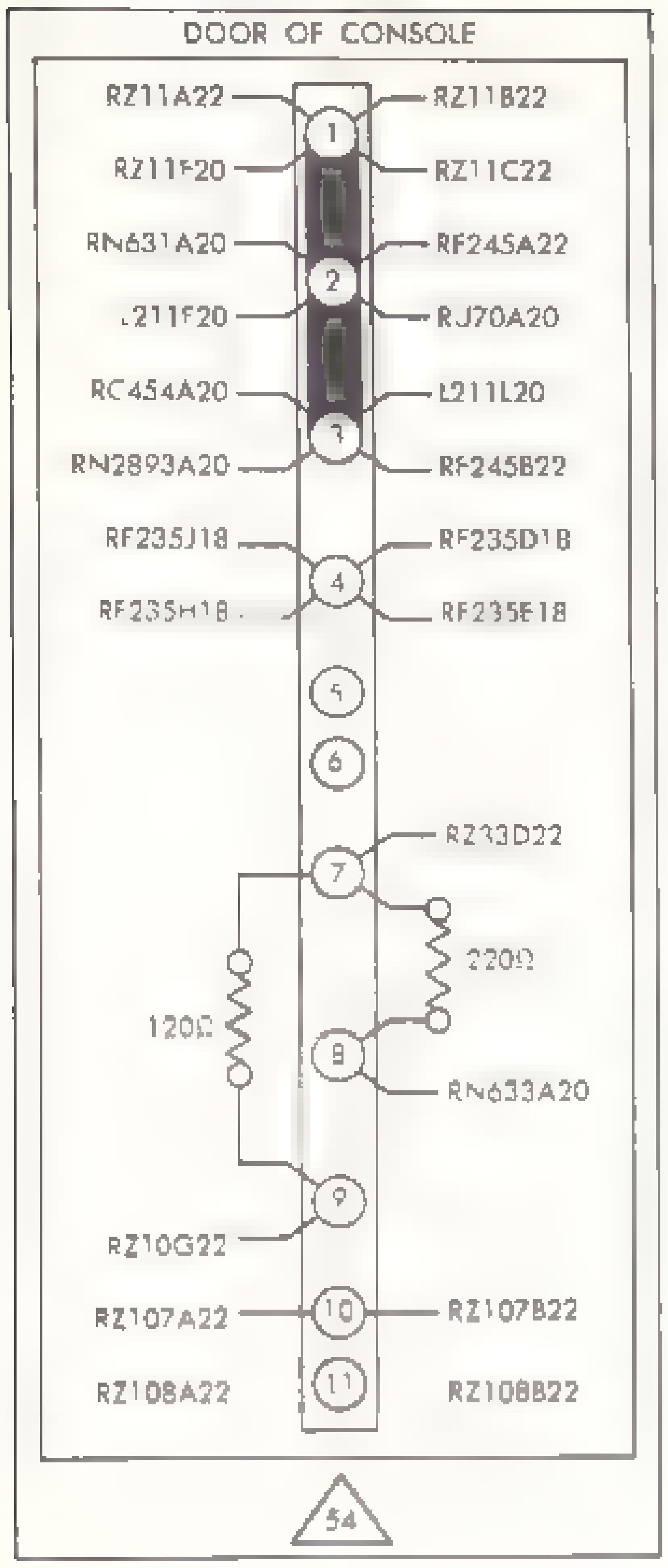
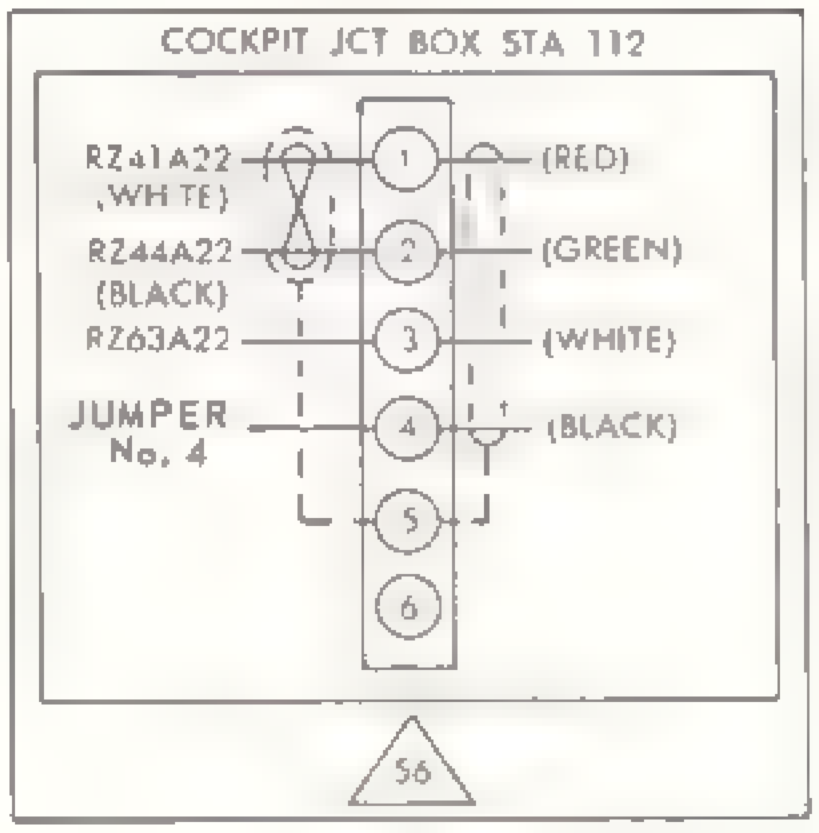
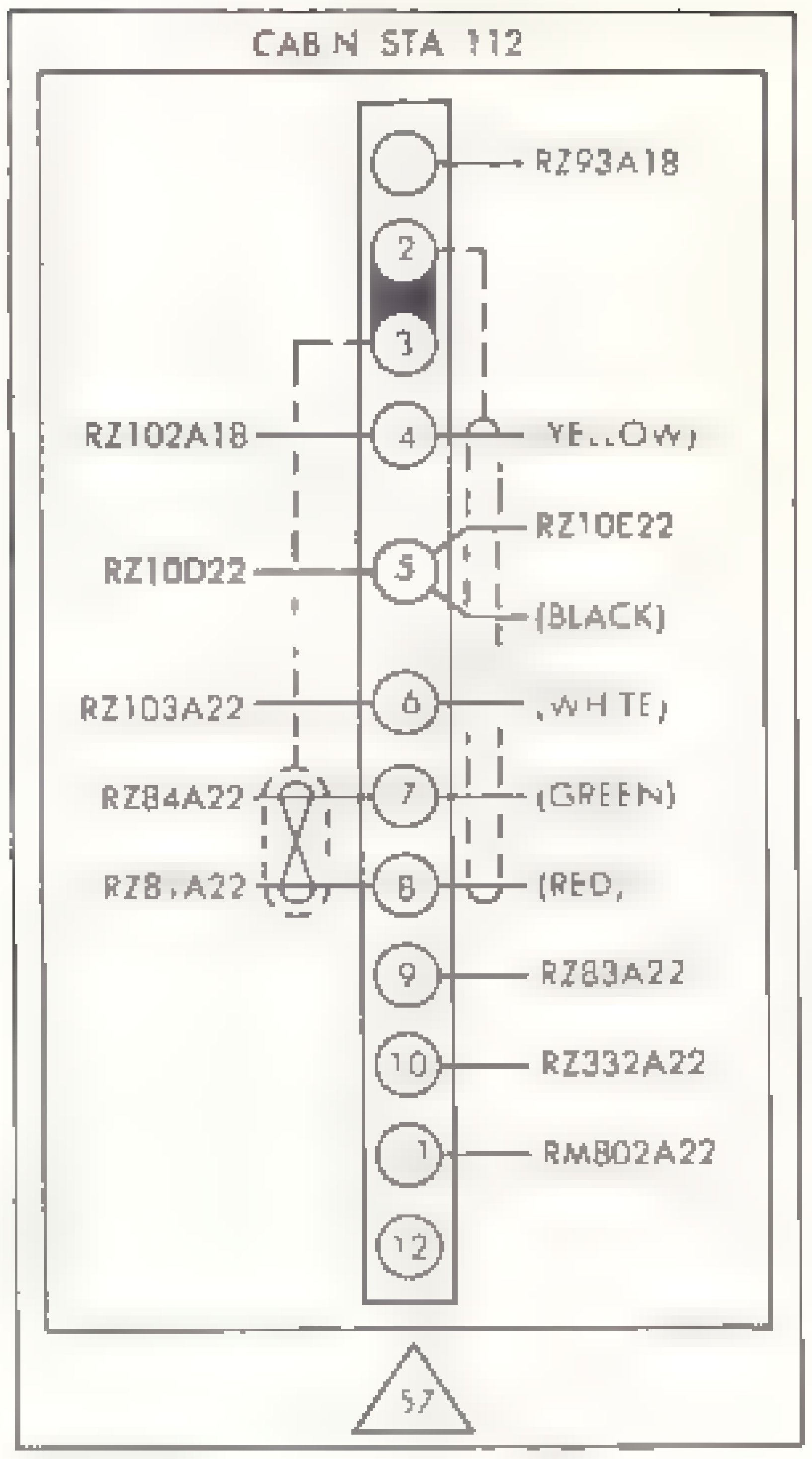
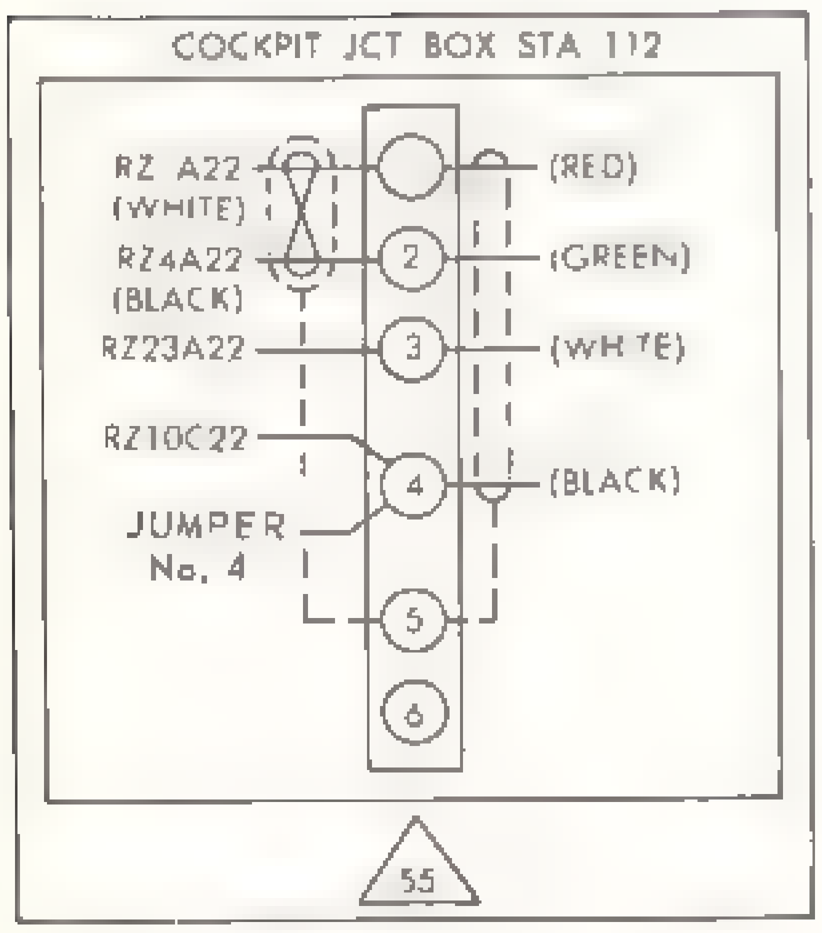


Figure 12-192. Post terminal chart — radio (model CH-34A serial No. 57 1726 through 57 1740) (Sheet 2 of 5)









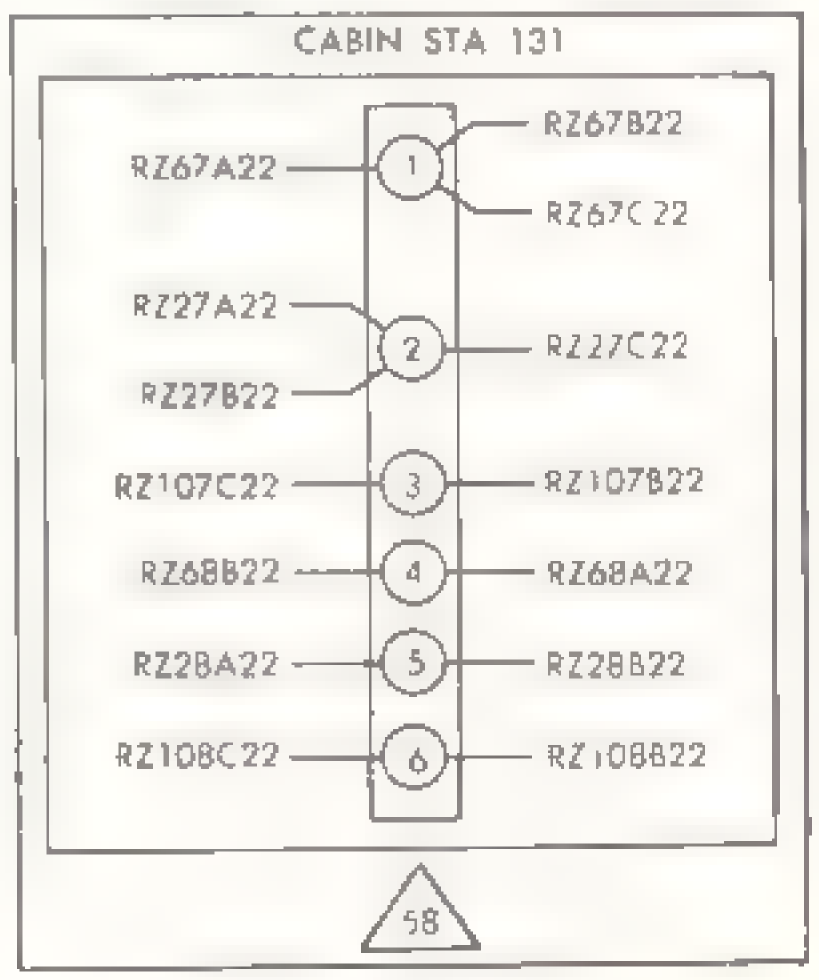


Figure 12–192. Post terminal chart – radio (model CH-34A serial No. 57-1726 through 57-1740) (Sheet 3 of 5)

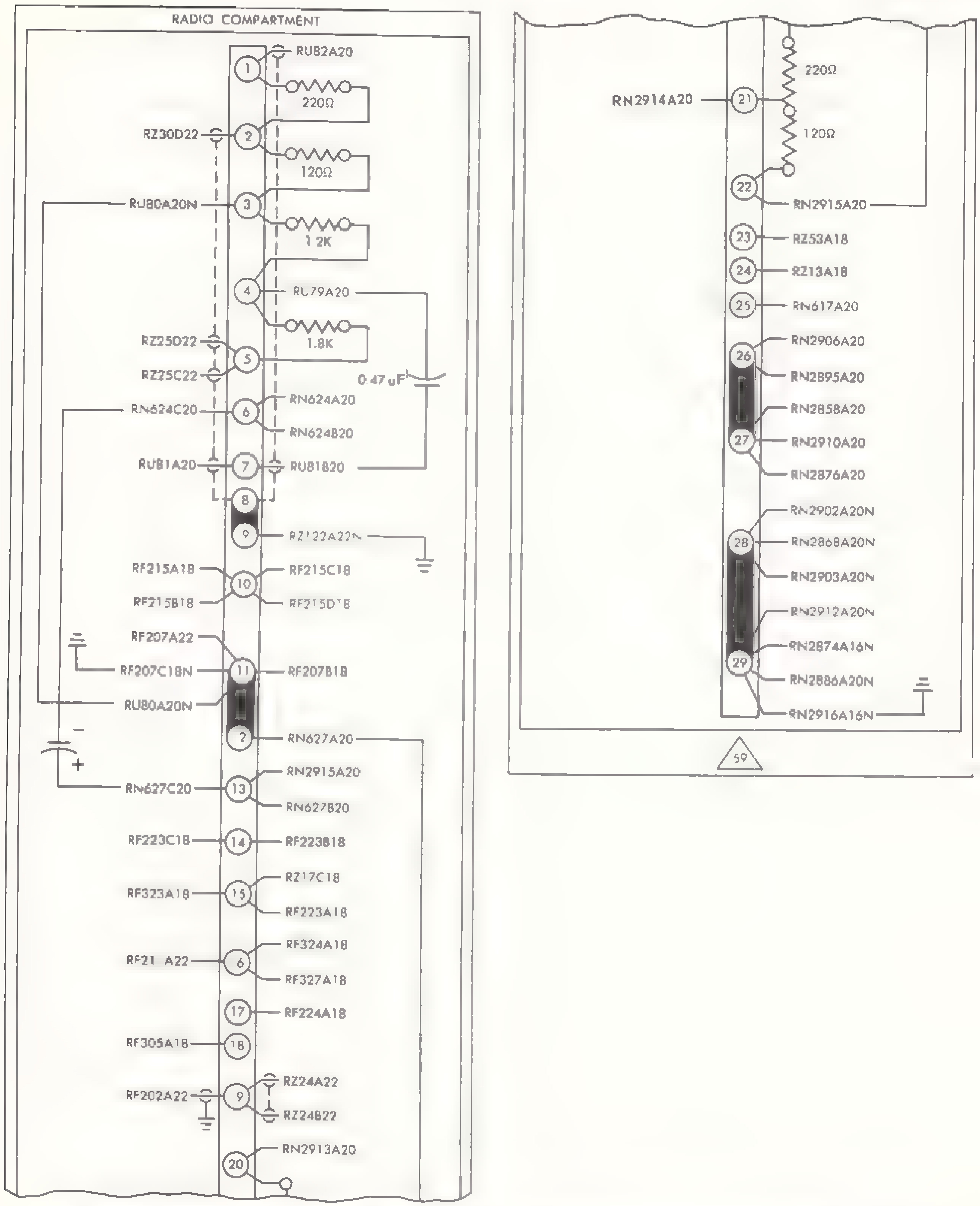


Figure 12–192 Post terminal chart – radio (model CH-34A serial No. 57-1726 through 57-1740) (Sheet 4 of 5)

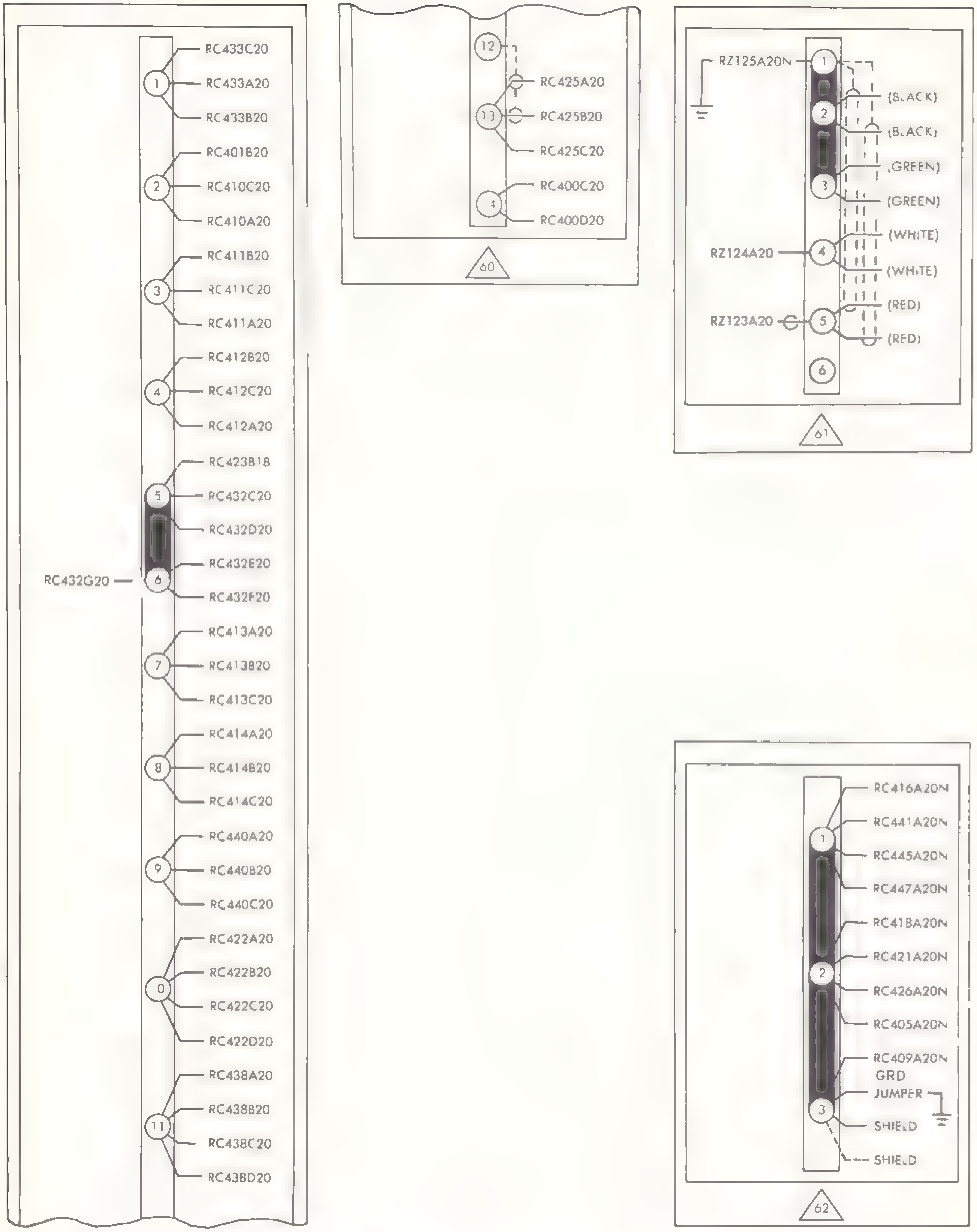
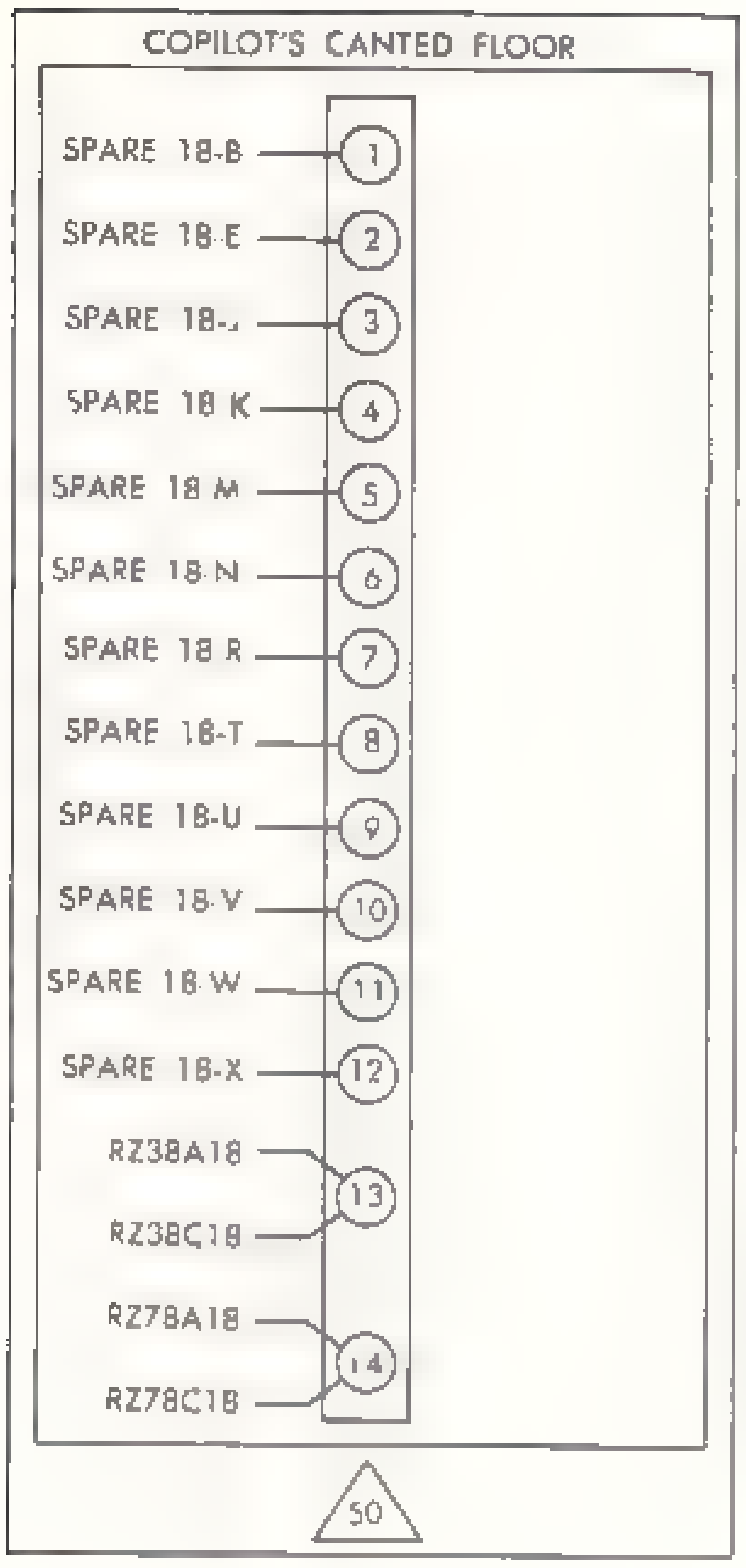


Figure 12—192. Post terminal chart — radio (model CH-34A serial No. 57-1726 through 57-1740) (Sheet 5 of 5)



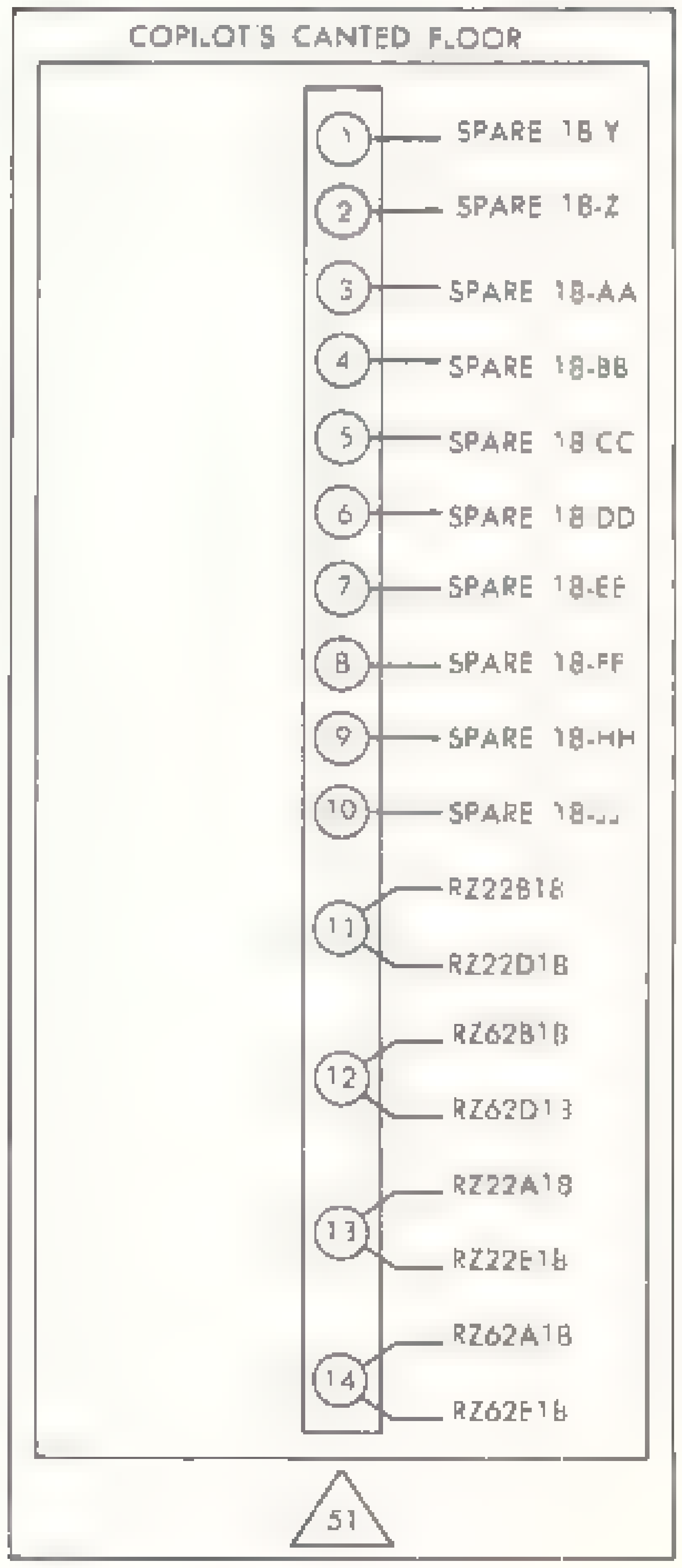


Figure 12–193. Post terminal chart – radio (model CH-34A serial No. 57-1741) (Sheet 1 of 4)

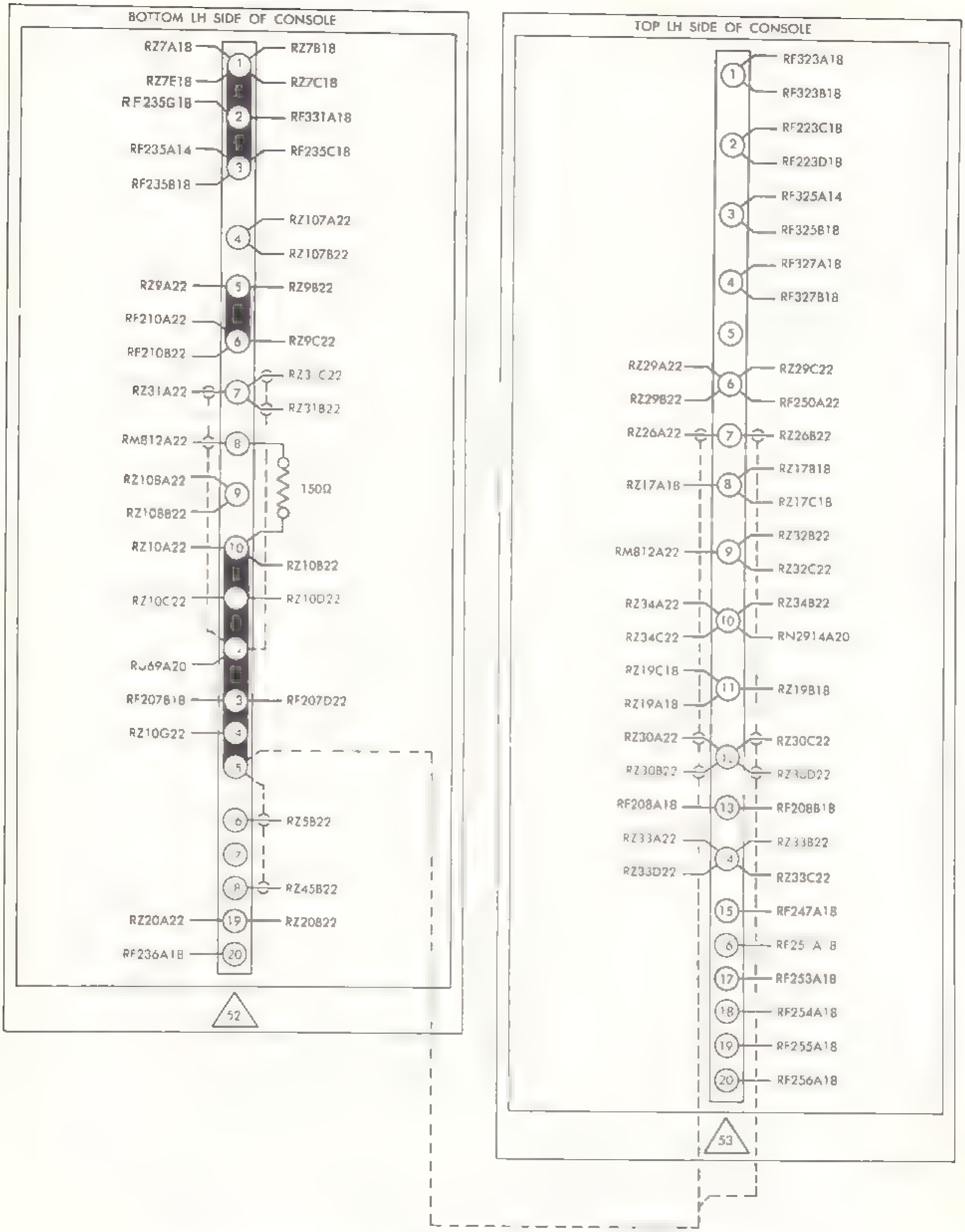


Figure 12–193. Post terminal chart – radio (model CH-34A serial No. 57-1741) (Sheet 2 of 4)

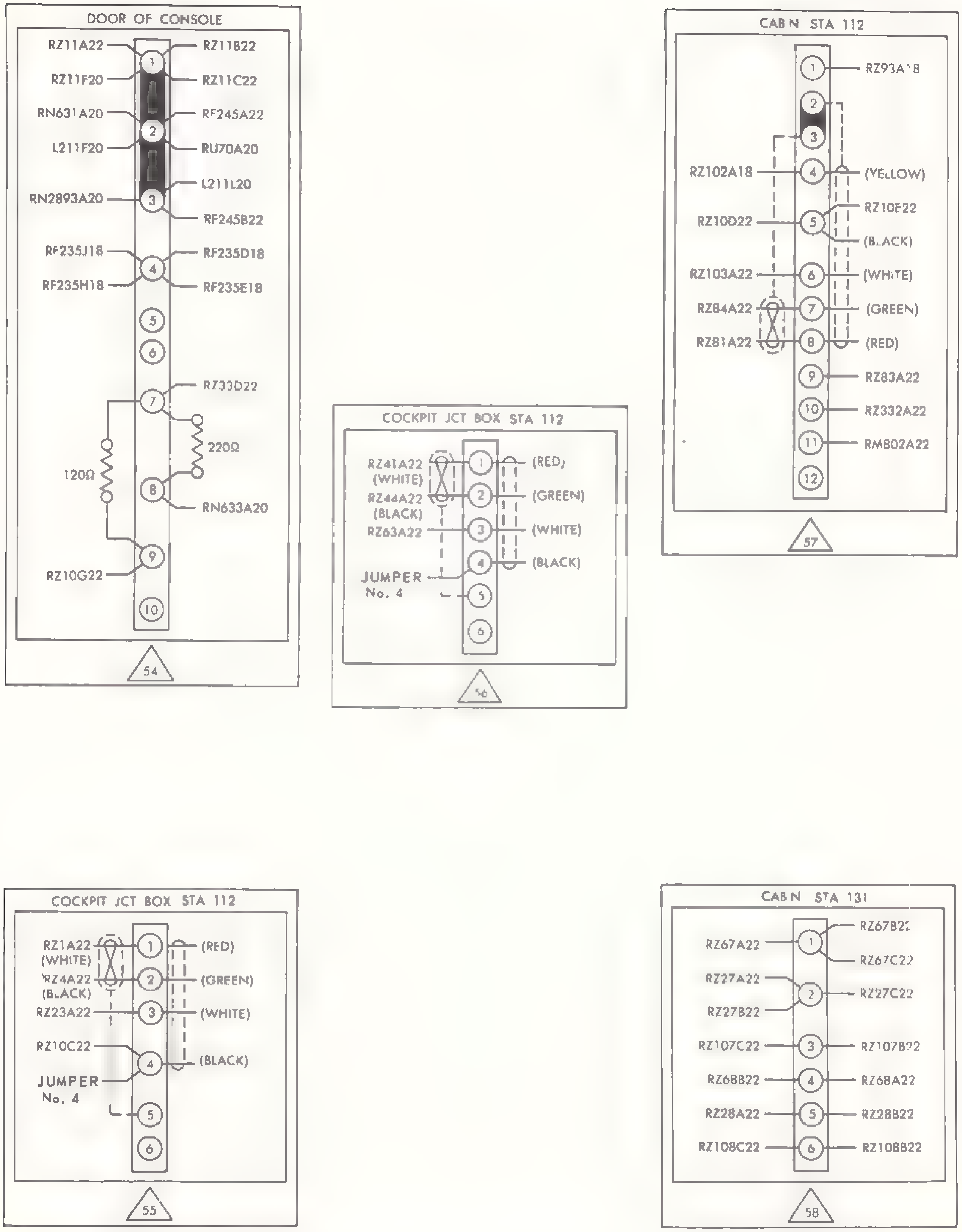


Figure 12—193. Post terminal chart — radio (model CH-34A serial No. 57-1741) (Sheet 3 of 4)

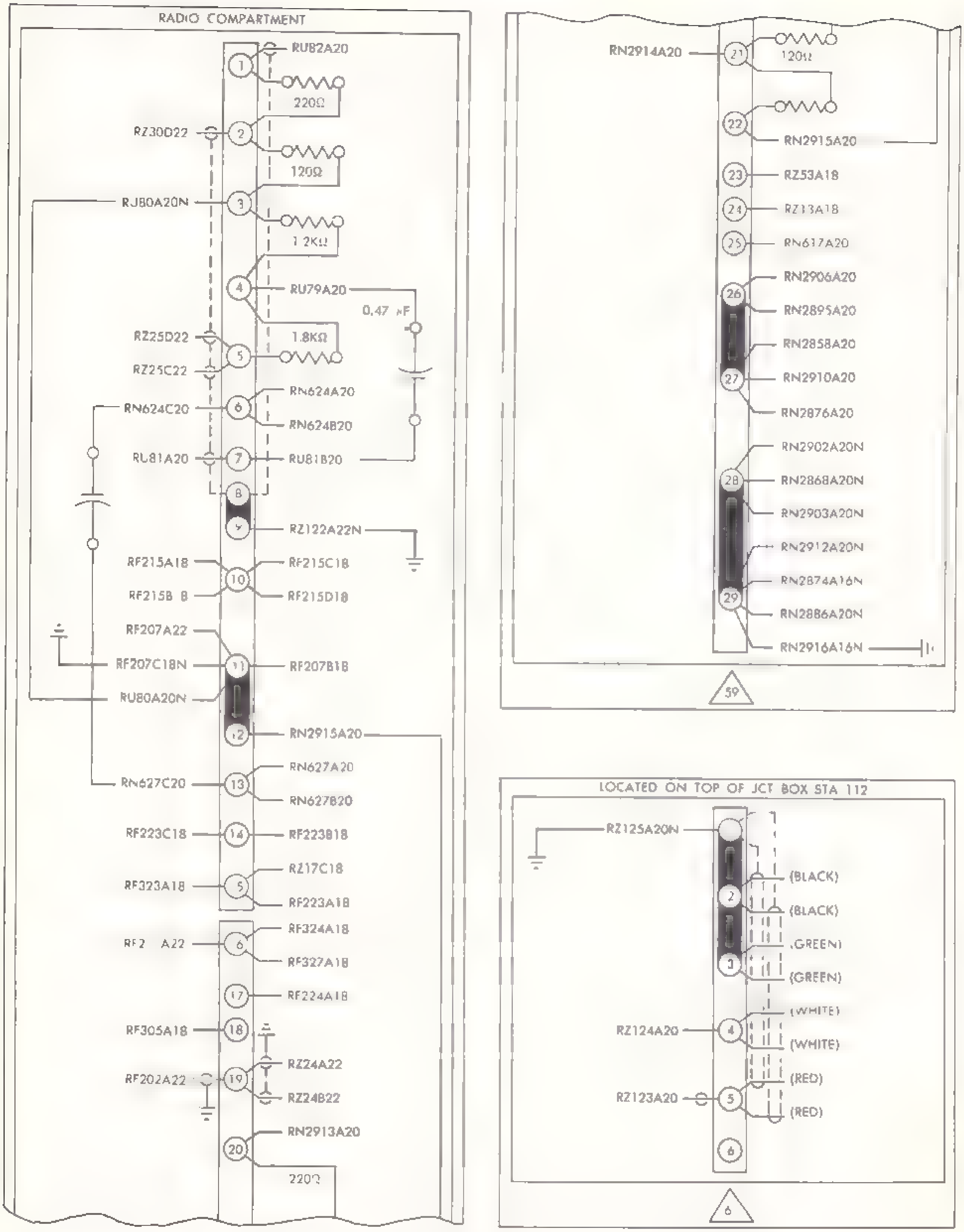


Figure 12–193. Post terminal chart — radio (model CH-34A serial No. 57-1741) (Sheet 4 of 4)

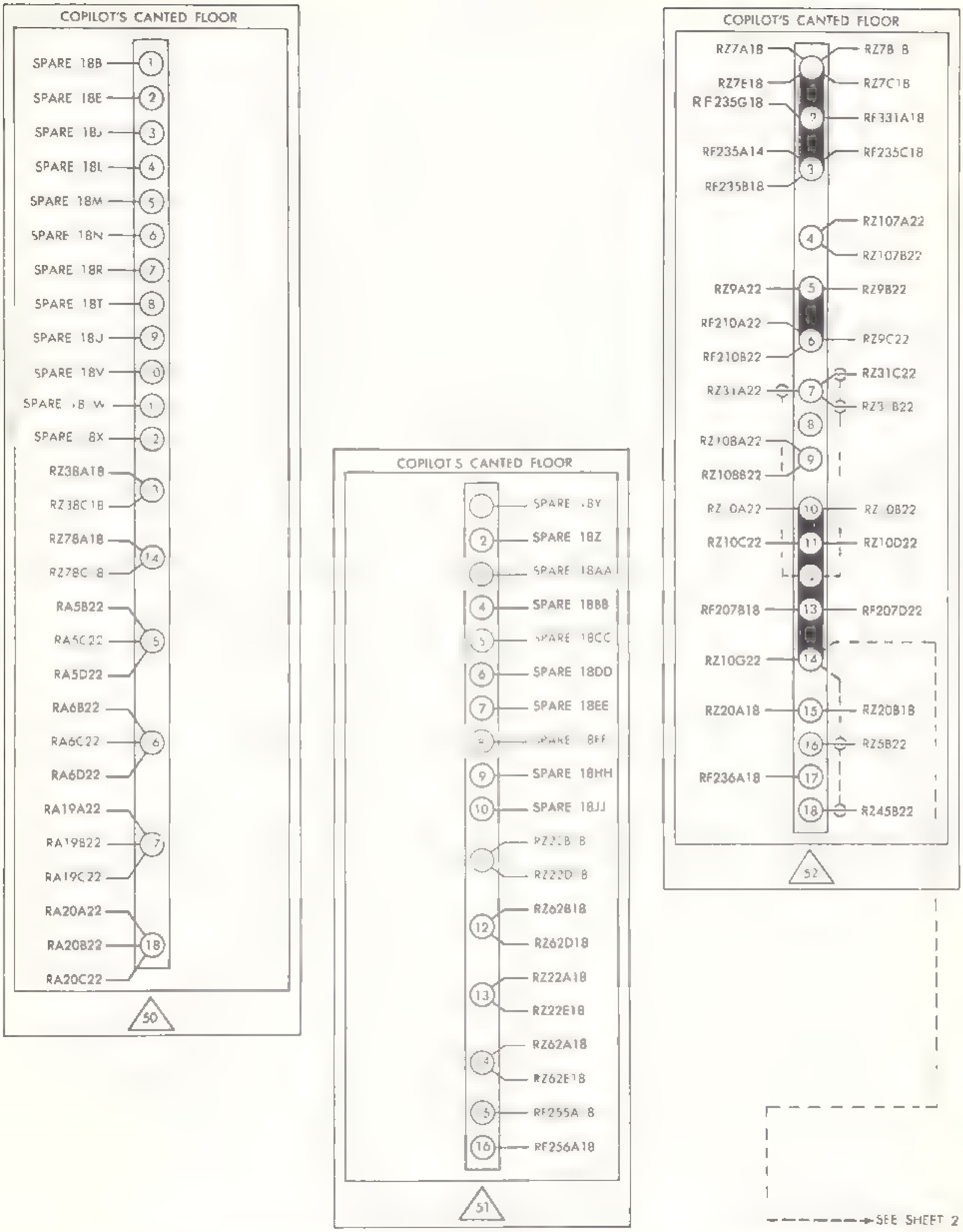


Figure 12–194. Post terminal chart – radio (model CH-34C serial No. 57-1742 and subsequent) (Sheet 1 of 4)

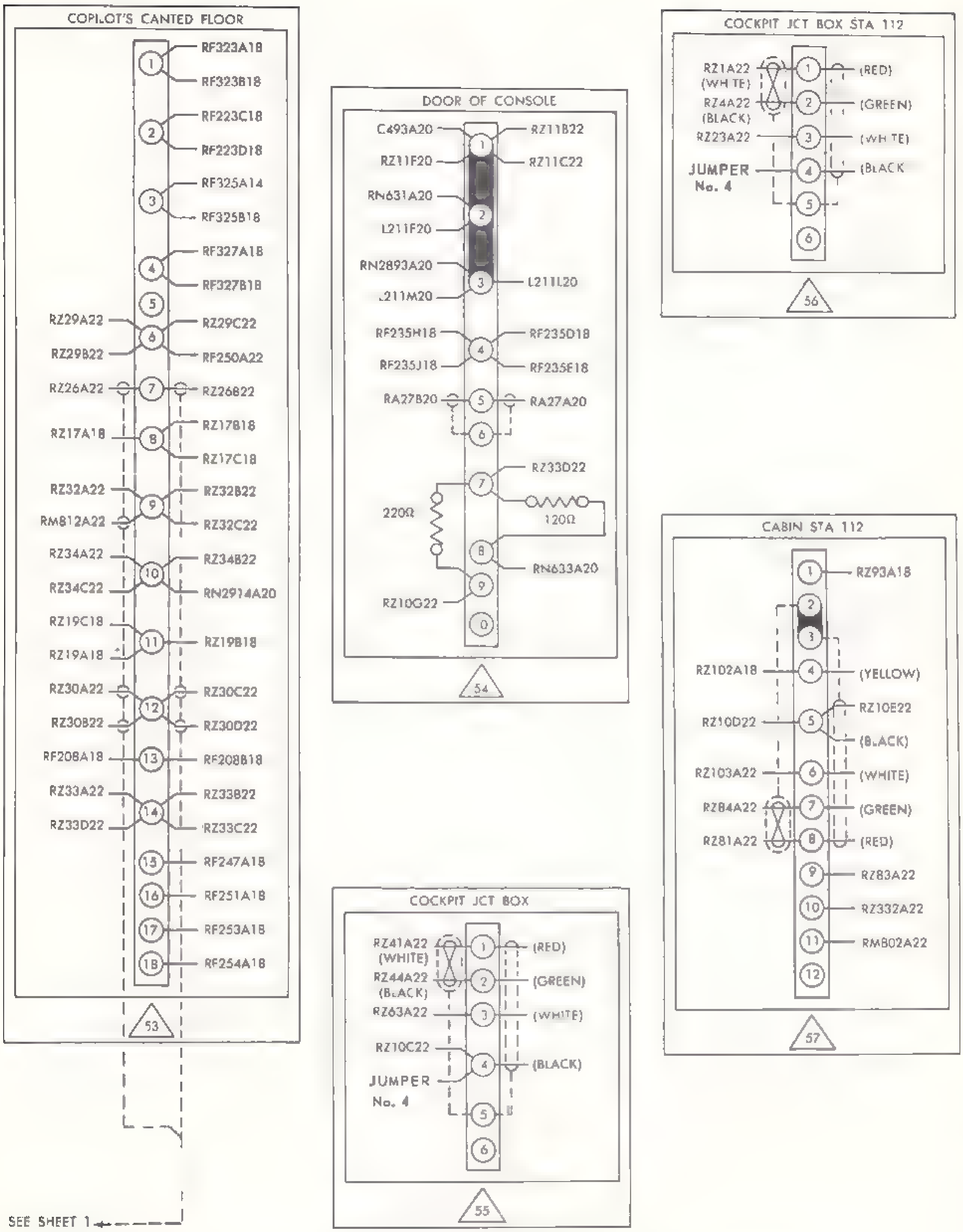


Figure 12—194. Post terminal chart — radio (model CH-34C serial No. 57-1742 and subsequent) (Sheet 2 of 4)

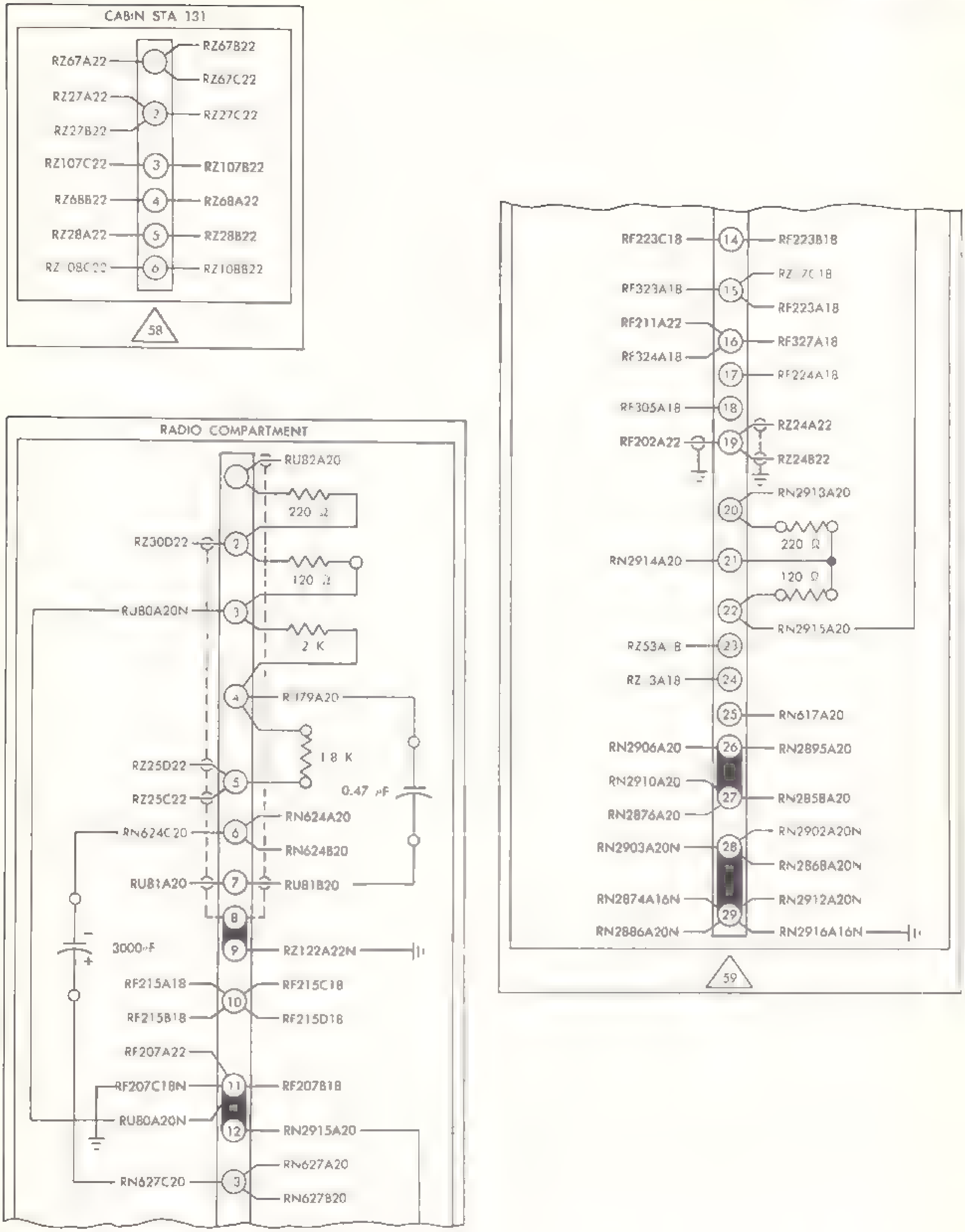
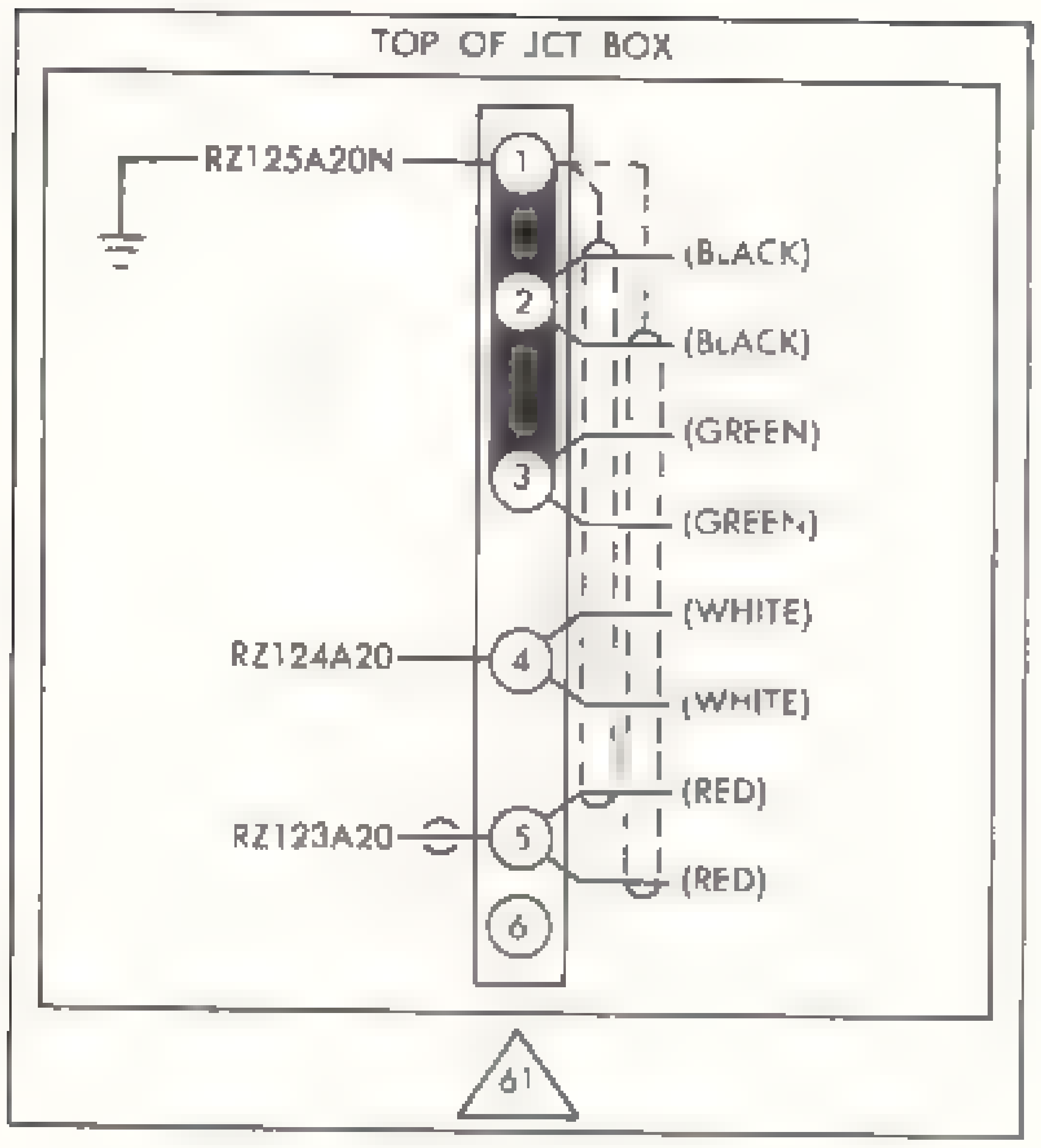
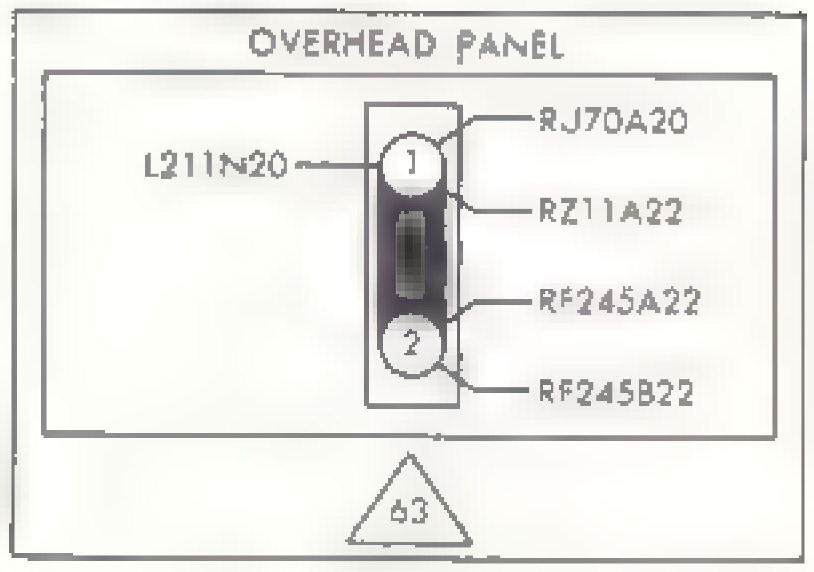


Figure 12–194. Post terminal chart – radio (model CH-34C serial No. 57-1742 and subsequent) (Sheet 3 of 4)





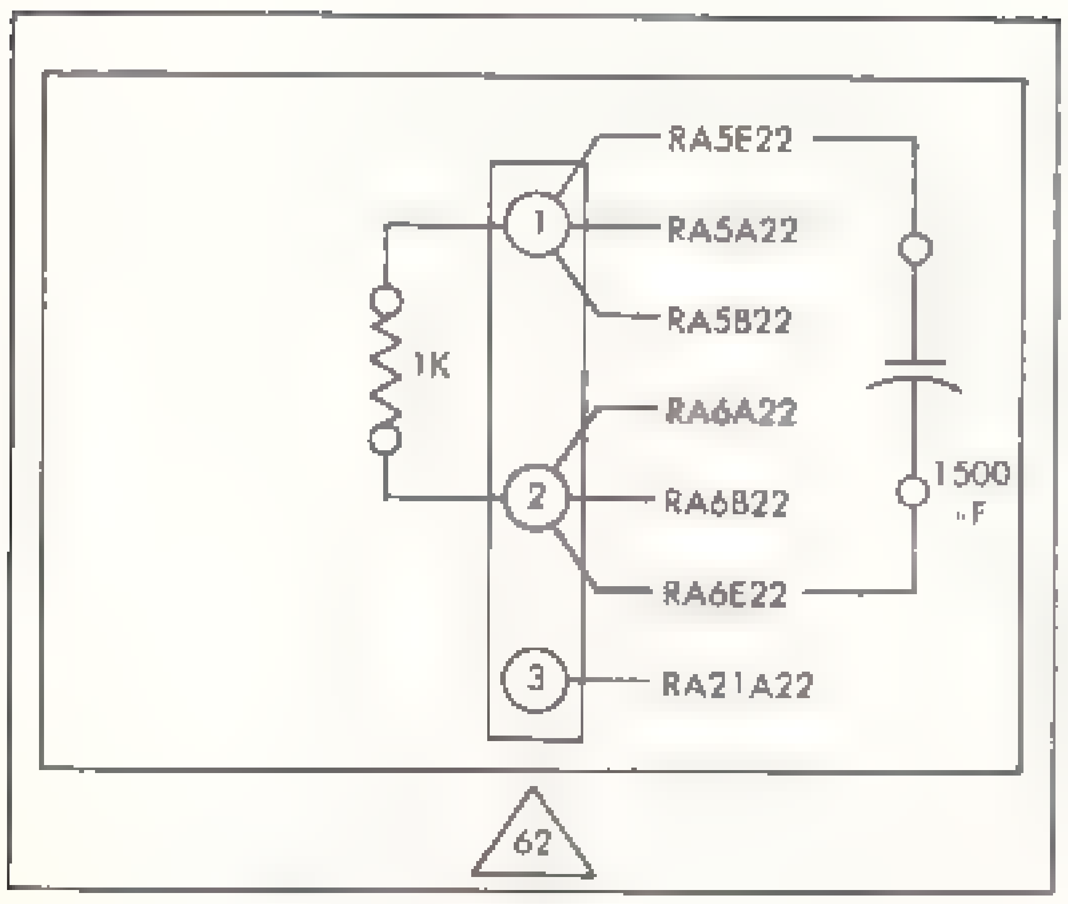
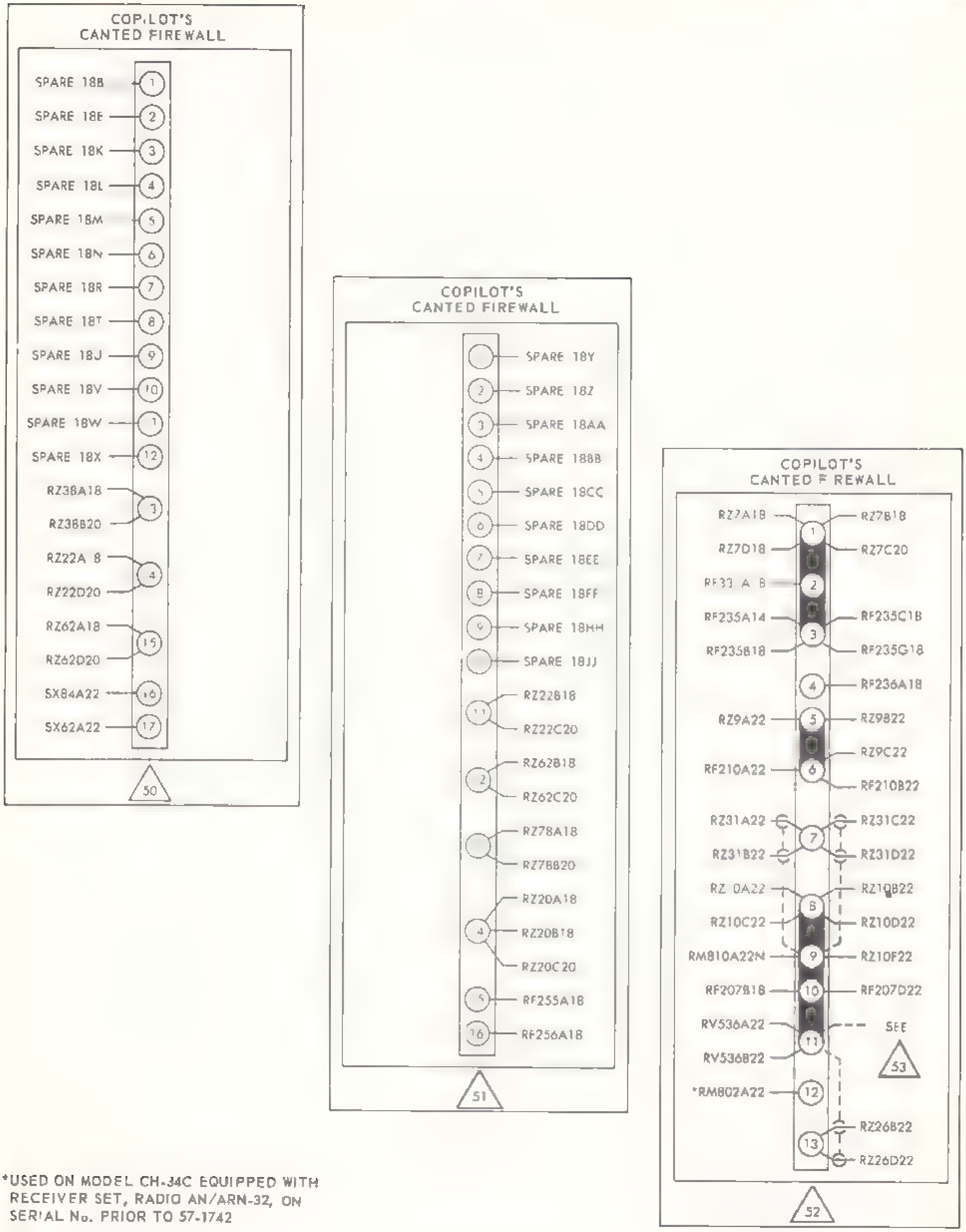


Figure 12–194. Post terminal chart – radio (model CH-34C serial No. 57-1742 and subsequent) (Sheet 4 of 4)



*USED ON MODEL CH-34C EQUIPPED WITH RECEIVER SET, RADIO AN/ARN-32, ON SERIAL No. PRIOR TO 57-1742

Figure 12–195. Post terminal chart – radio (model CH-34C serial No. prior to 57-1742) (Sheet 1 of 3)

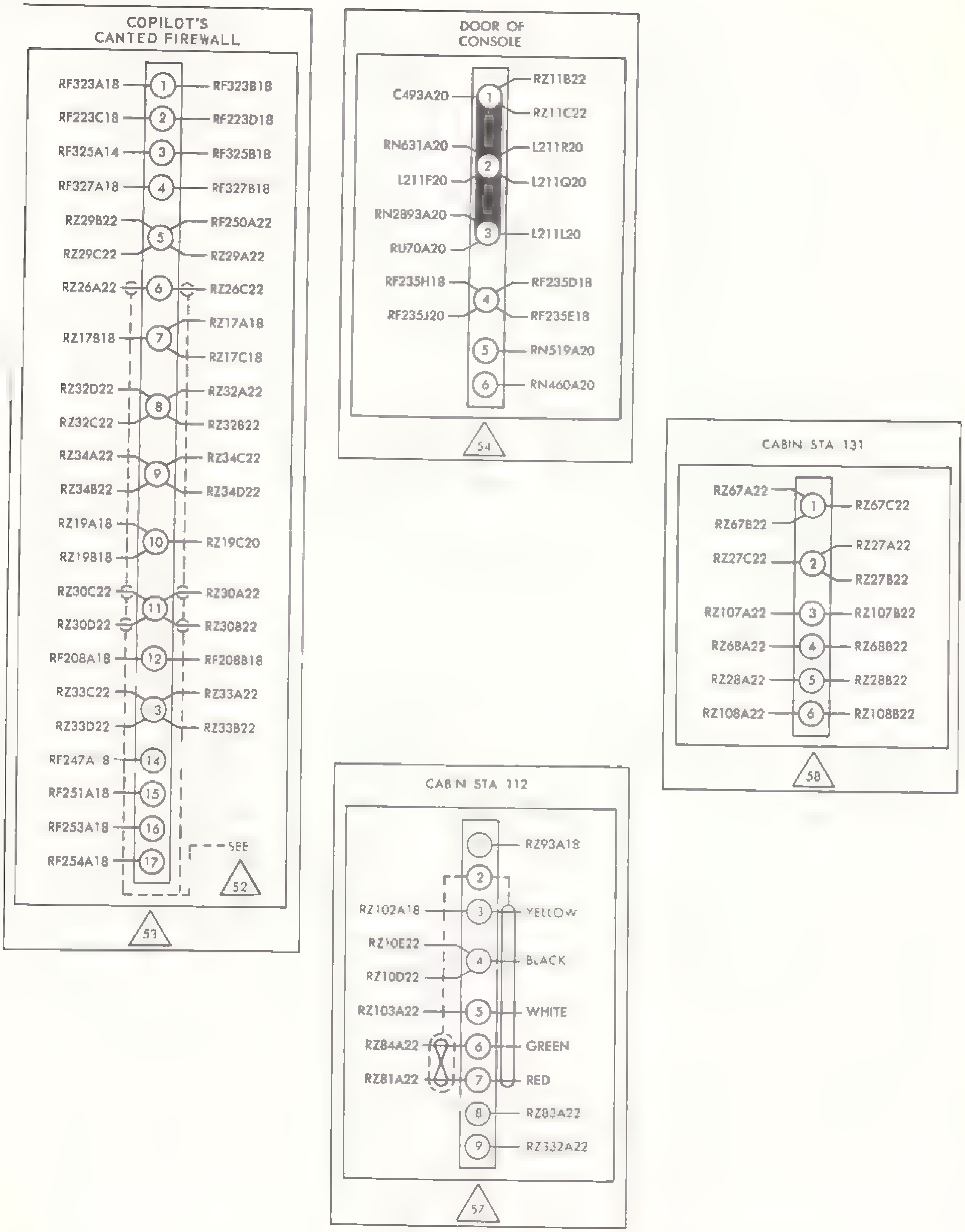


Figure 12–195. Post terminal chart – radio (model CH-34C serial No. prior to 57-1742) (Sheet 2 of 3)

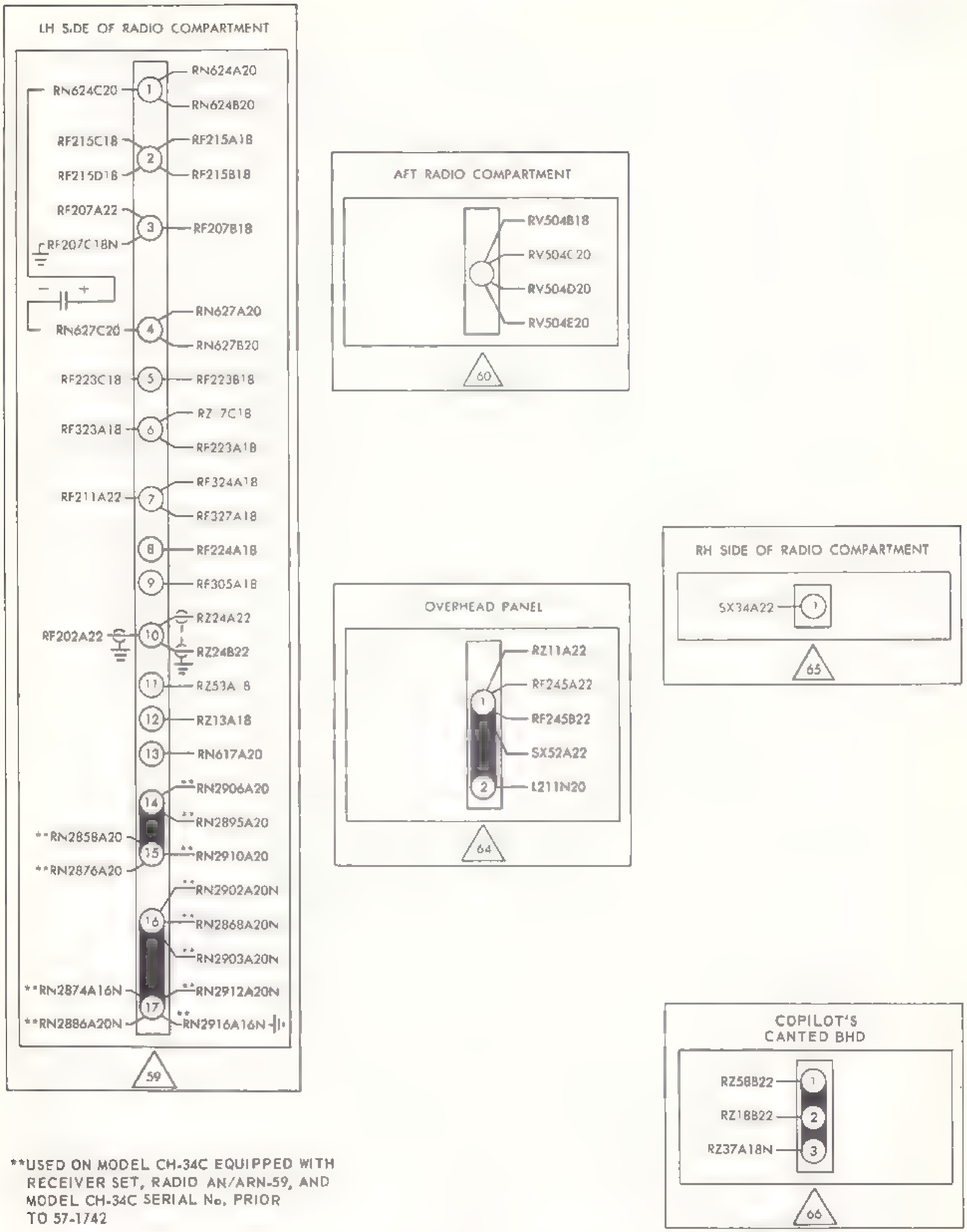


Figure 12—195. Post terminal chart — radio (model CH-34C serial No. prior to 57-1742) (Sheet 3 of 3)

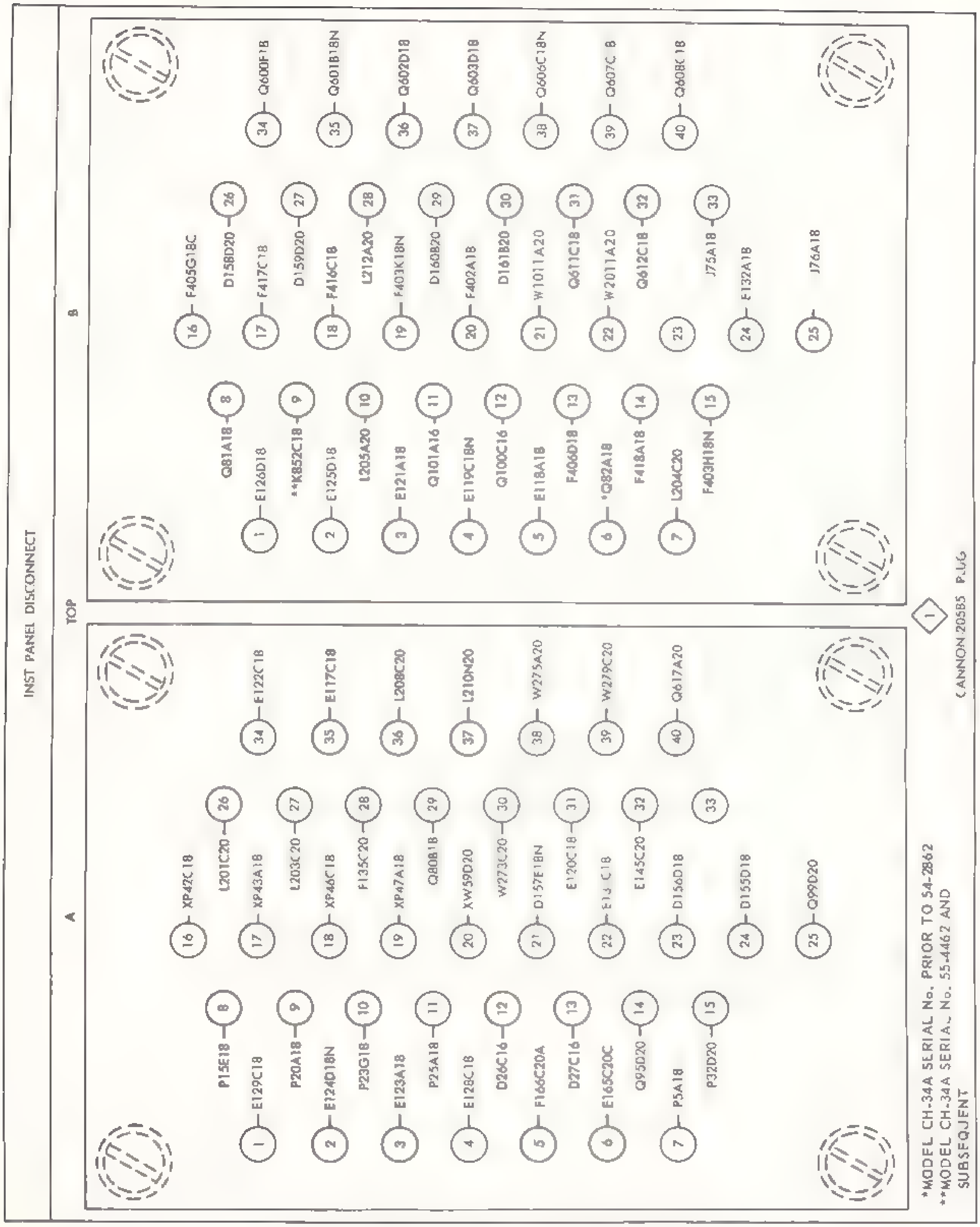
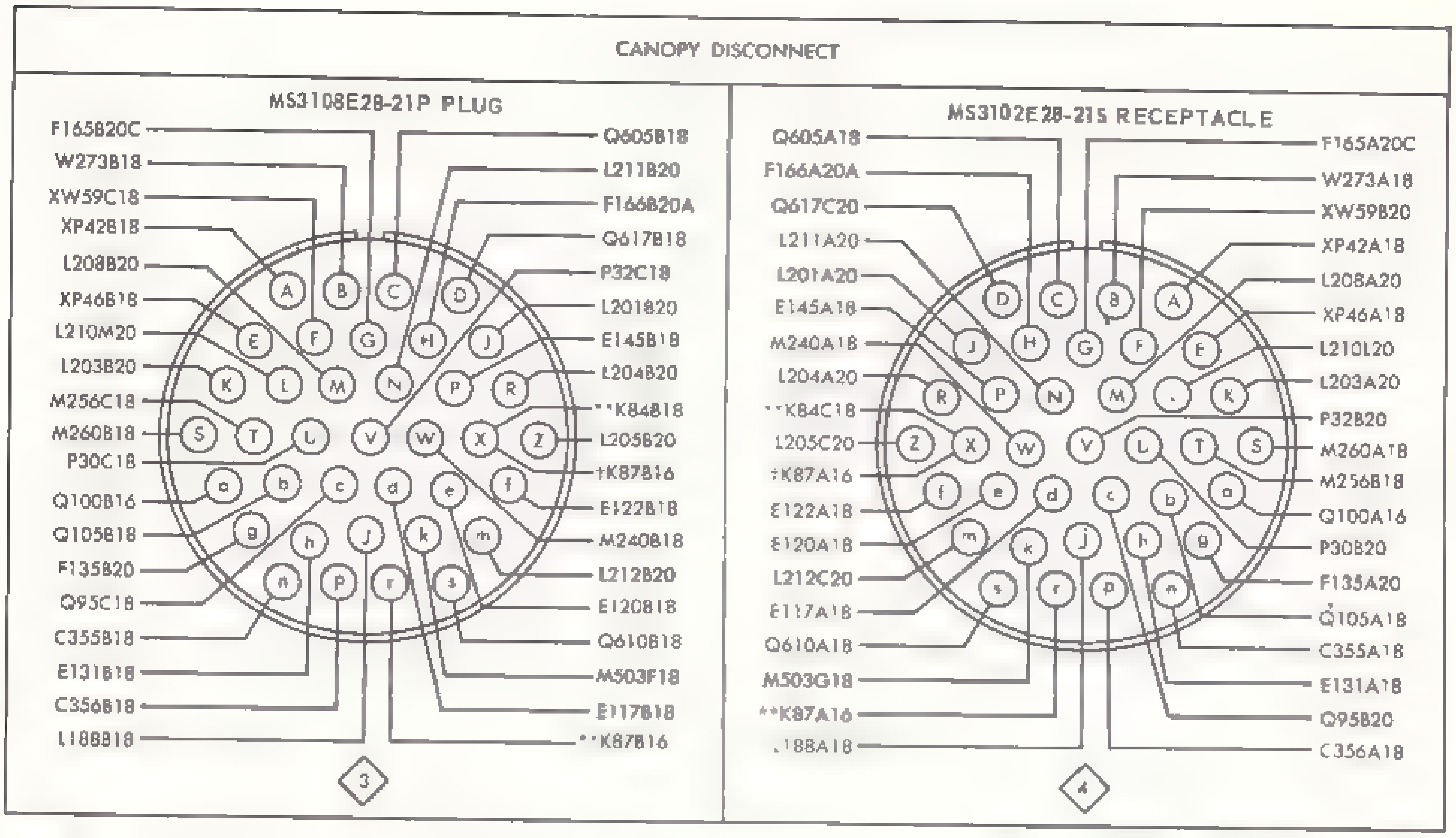
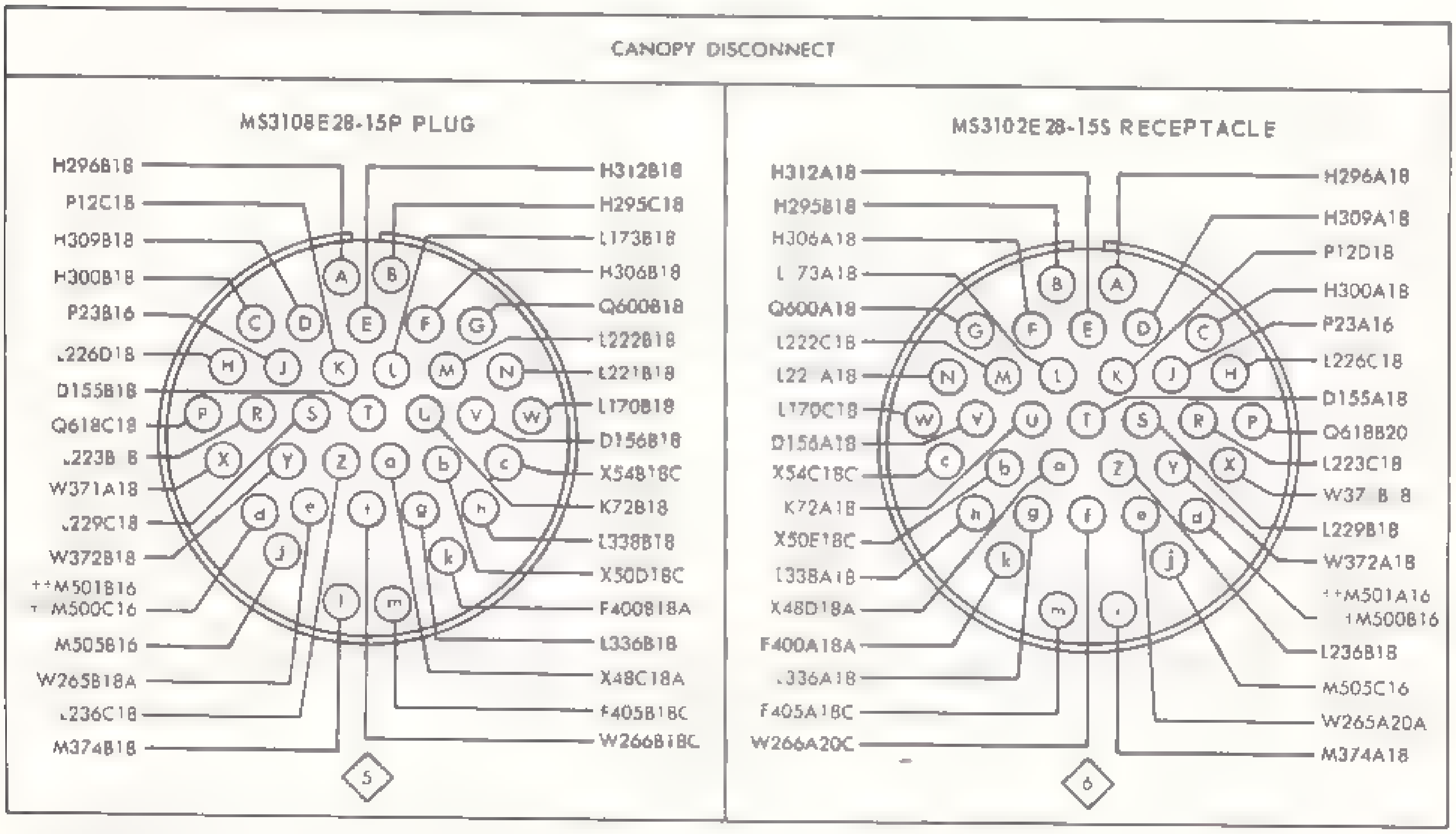


Figure 12–196 Disconnect plug and receptacle chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 1 of 7)

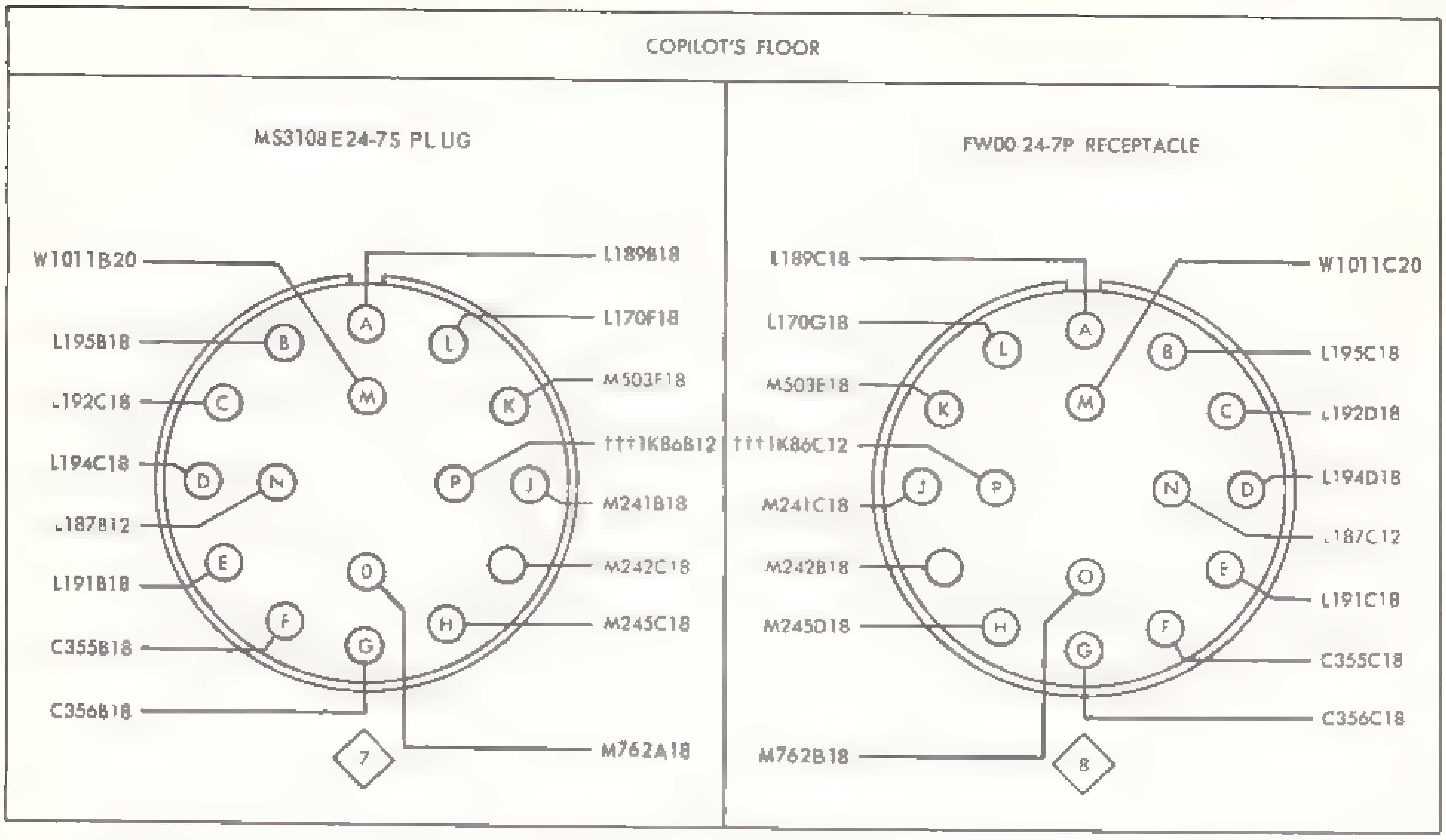


**MODEL CH-34A SERIAL No. 55-4462 AND SUBSEQUENT
†MODEL CH-34A SERIAL No. PRIOR TO 55-4462

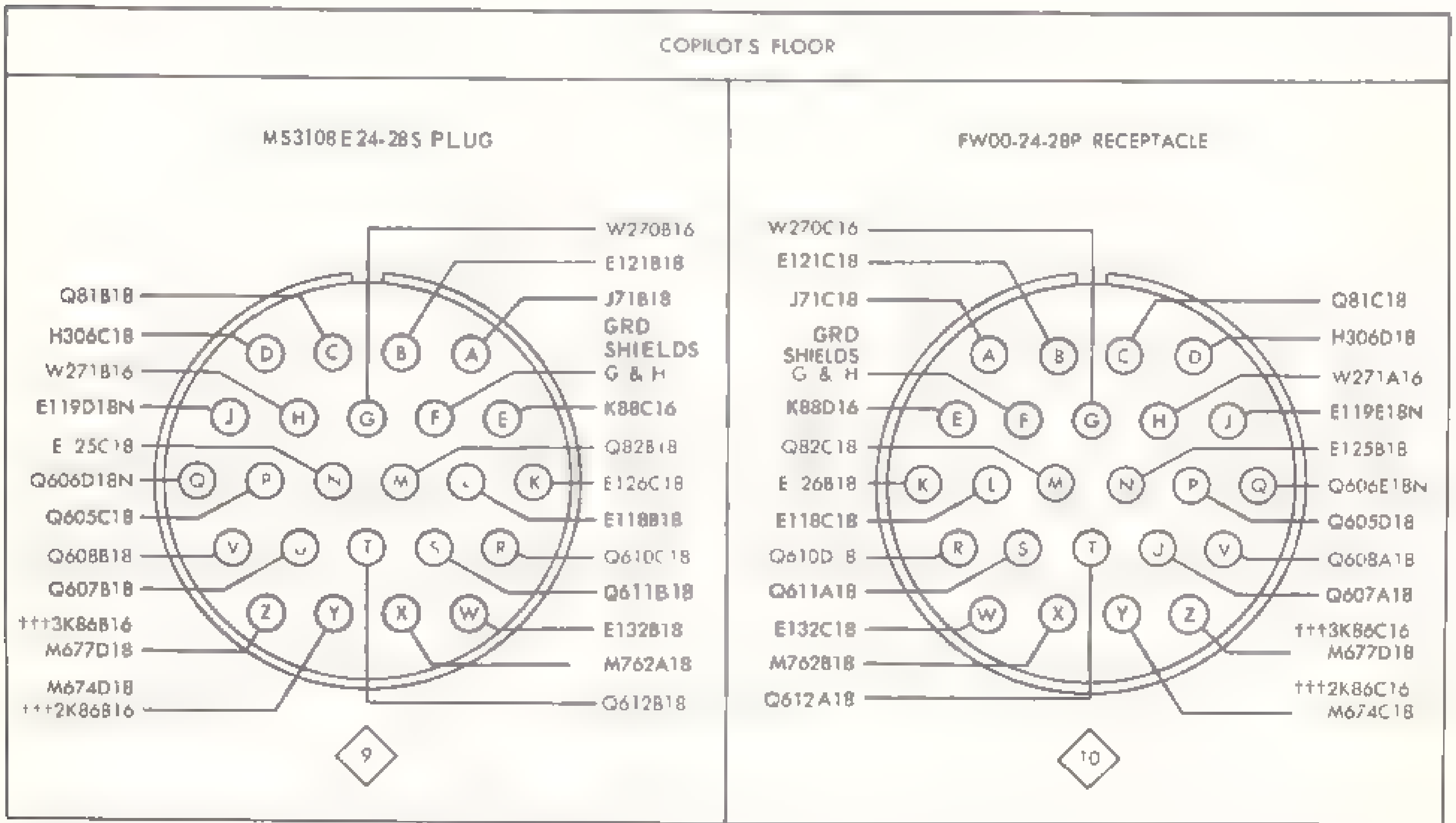


††MODEL CH-34A SERIAL No. PRIOR TO 56-4284
†††MODEL CH-34A SERIAL No. 56-4284AND SUBSEQUENT

Figure 12—196. Disconnect plug and receptacle chart — electrical (model CH 34A serial No. prior to 56-4313) (Sheet 3 of 7)



†††MODEL CH-34A SERIAL No 56-4284 AND SUBSEQUENT



***MODEL CH-34A SERIAL No. 55-4489 AND SUBSEQUENT
†††MODEL CH-34A SERIAL No. 56-4284 AND SUBSEQUENT

Figure 12–196 Disconnect plug and receptacle chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 4 of 7)

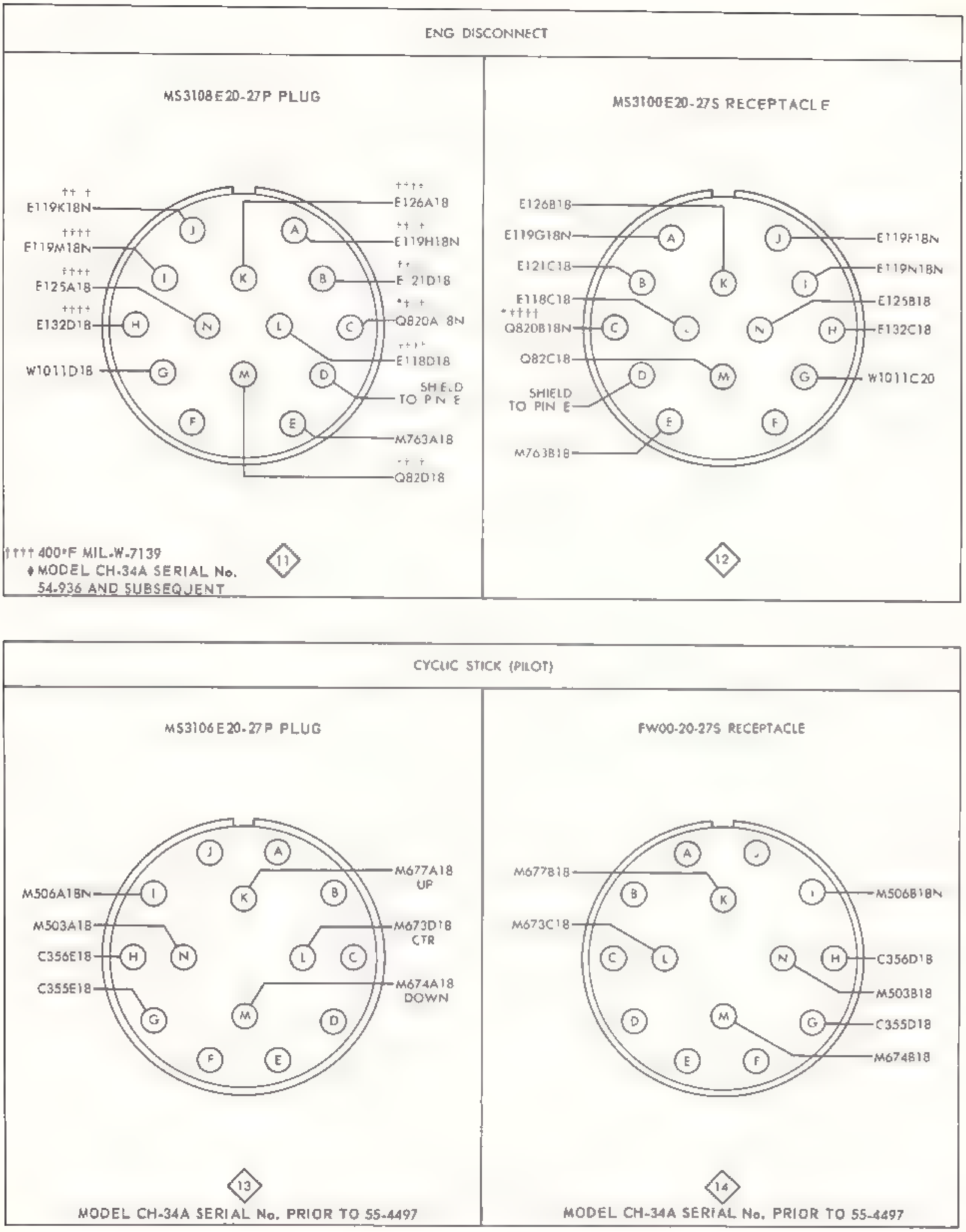
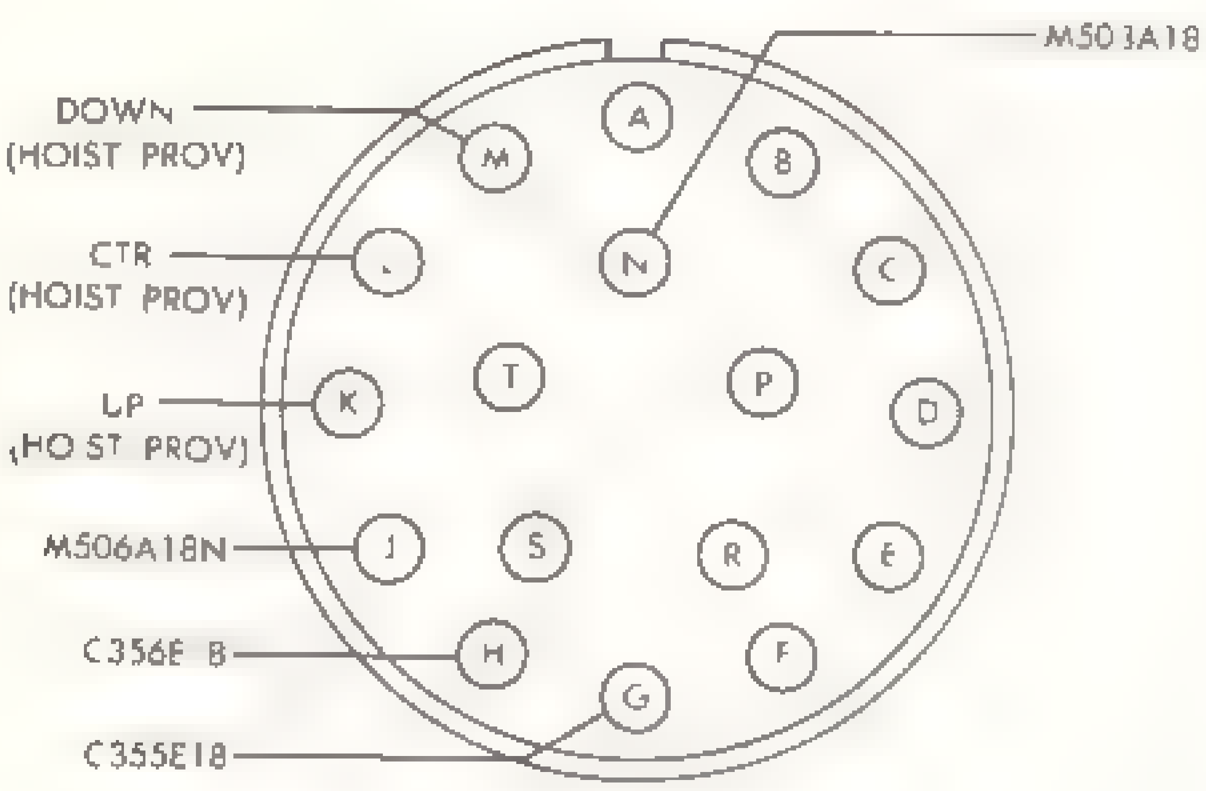


Figure 12–196. Disconnect plug and receptacle chart – electrical (model CH 34A serial No. prior to 56-4313) (Sheet 5 of 7)

CYCLIC STICK (PILOT)

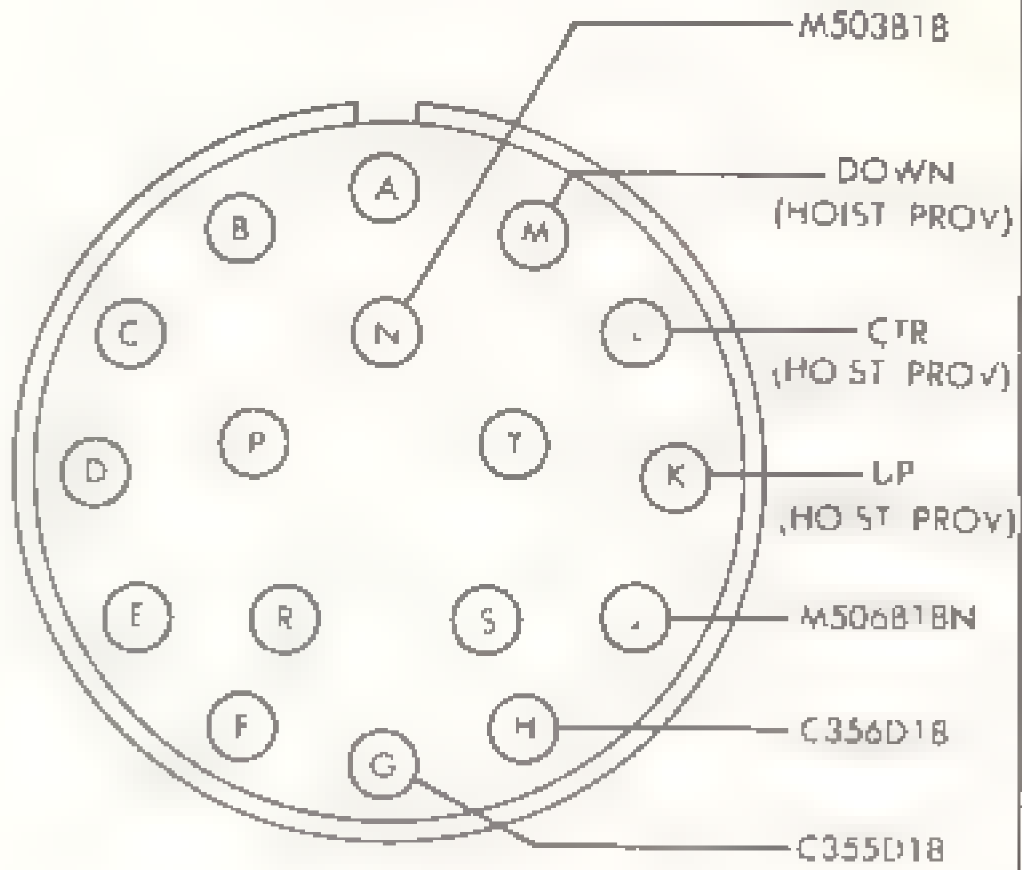
MS3102A20-29P PLUG



3

MODEL CH-34A SERIAL No. 55-4497 AND SUBSEQUENT

54A3A225-20-29S RECEPTACLE

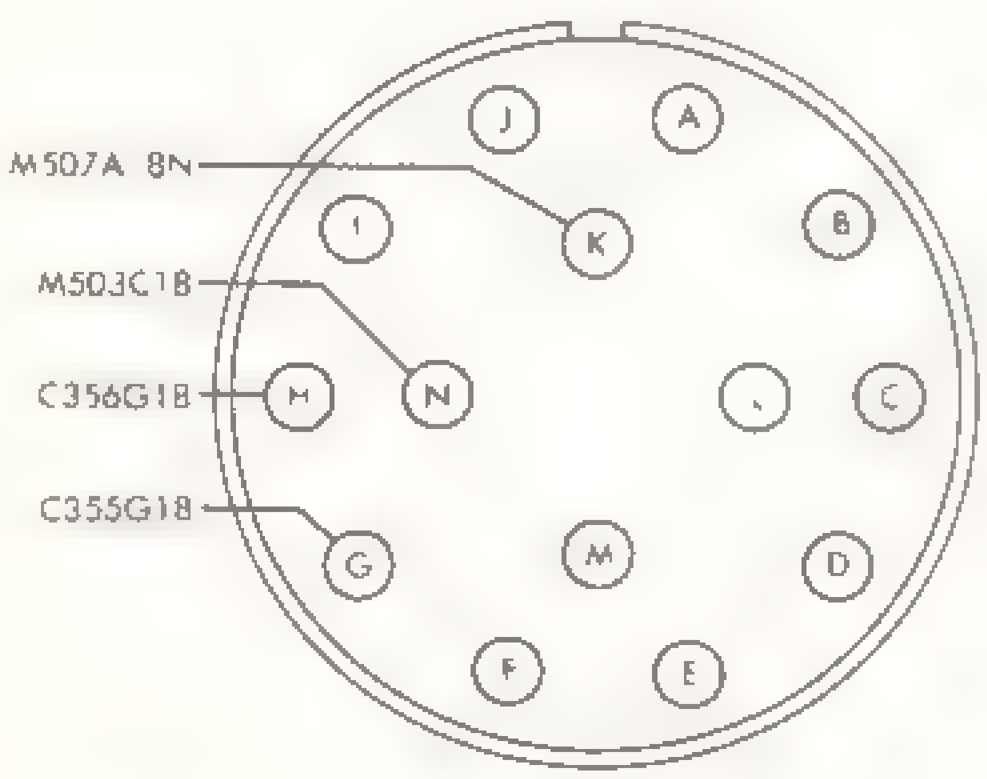


14

MODEL CH-34A SERIAL No. 55-4497 AND SUBSEQUENT

CYCLIC STICK (COPILOT)

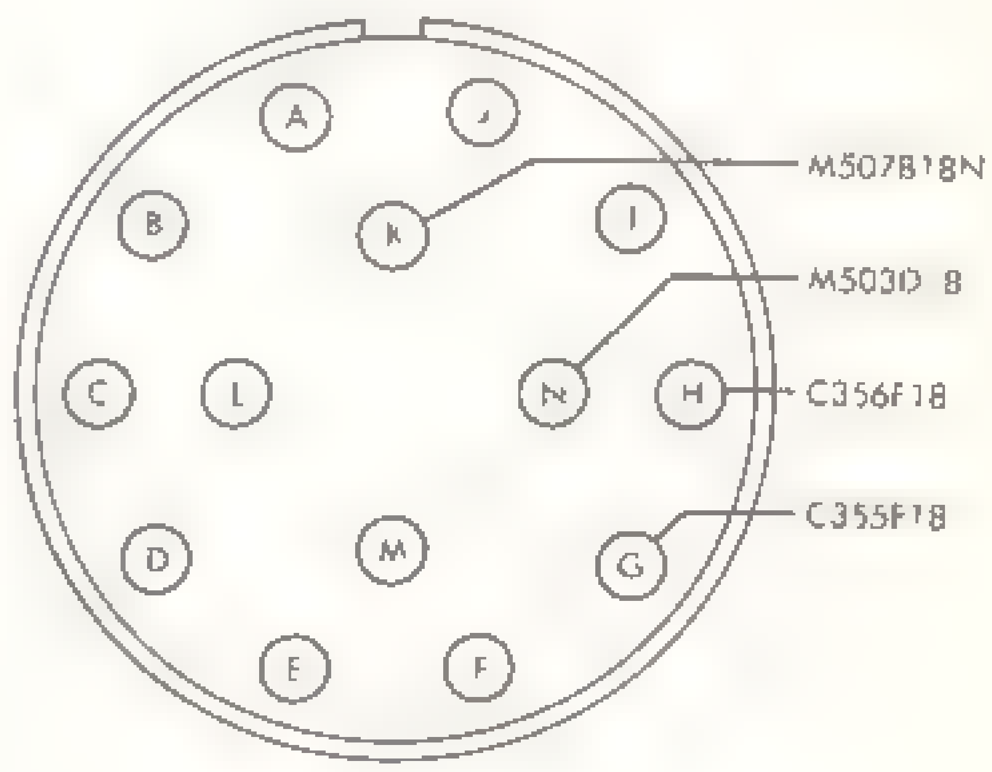
MS3106E20-27P PLUG



5

MODEL CH-34A SERIAL No. PRIOR TO 55-4497

FW00-20-27S RECEPTACLE



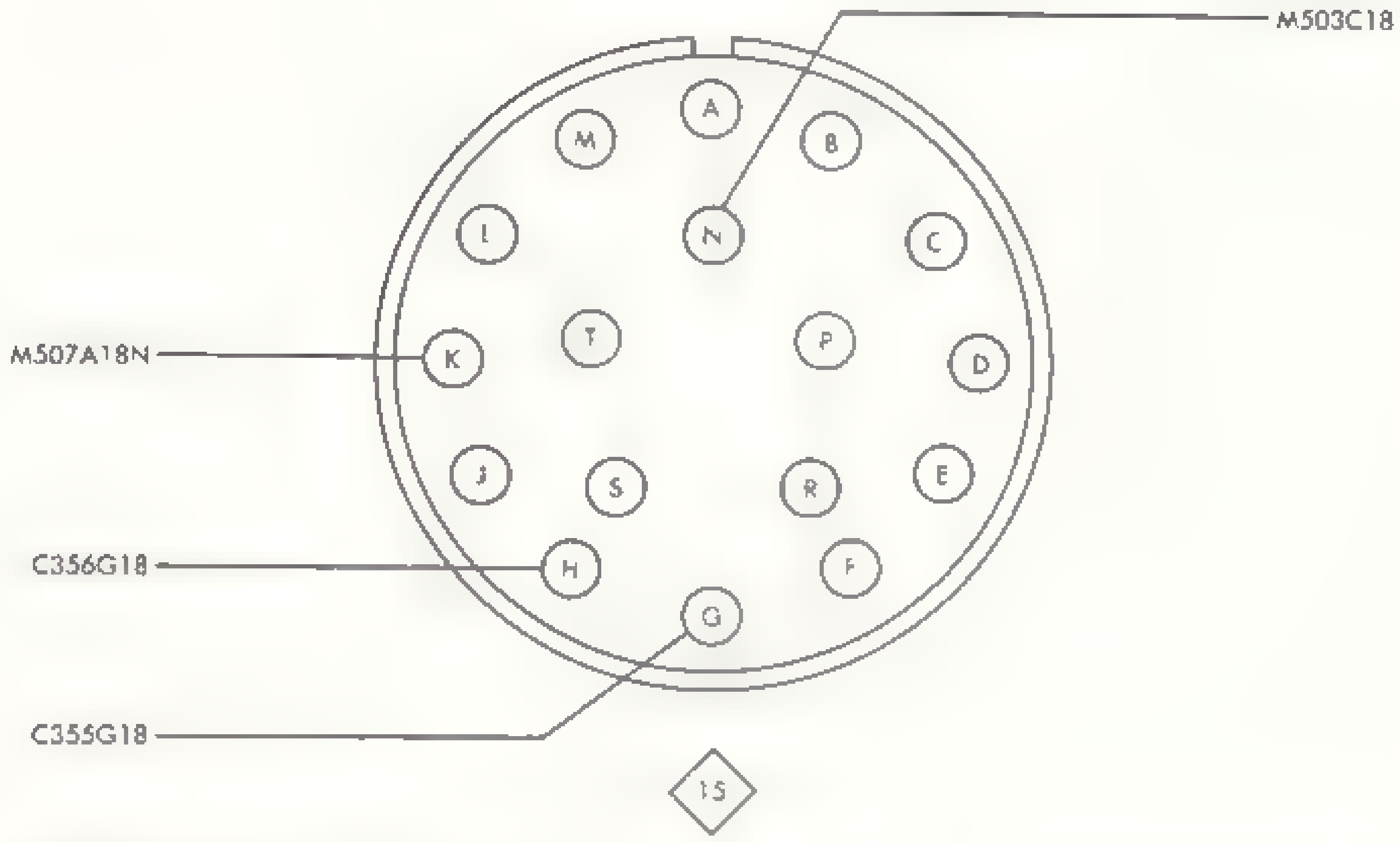
16

MODEL CH-34A SERIAL No. PRIOR TO 55-4497

Figure 12—196 Disconnect plug and receptacle chart – electrical (model CH-34A serial No. prior to 56-4313) (Sheet 6 of 7)

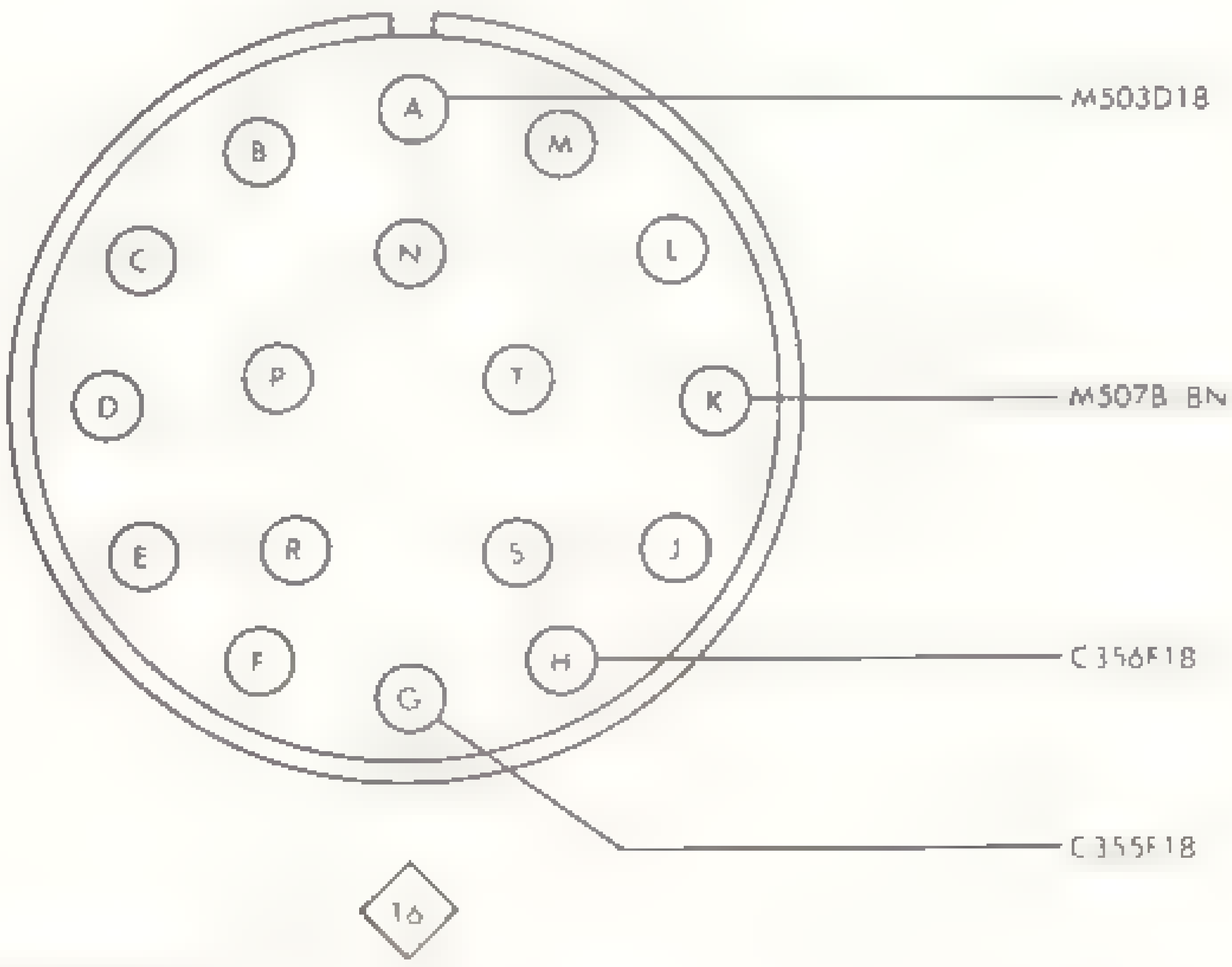
CYCLIC STICK (COPILOT)

MS3102A20-29P PLUG



MODEL CH-34A SERIAL No. 55-4497 AND SUBSEQUENT

54A3A225-20-29S RECEPTACLE



MODEL CH-34A SER AL No. 55-4497AND SUBSEQUENT

Figure 12 196 Disconnect plug and receptacle chart — electrical (model CH 34A serial No. prior to 56 4313) (Sheet 7 of 7)

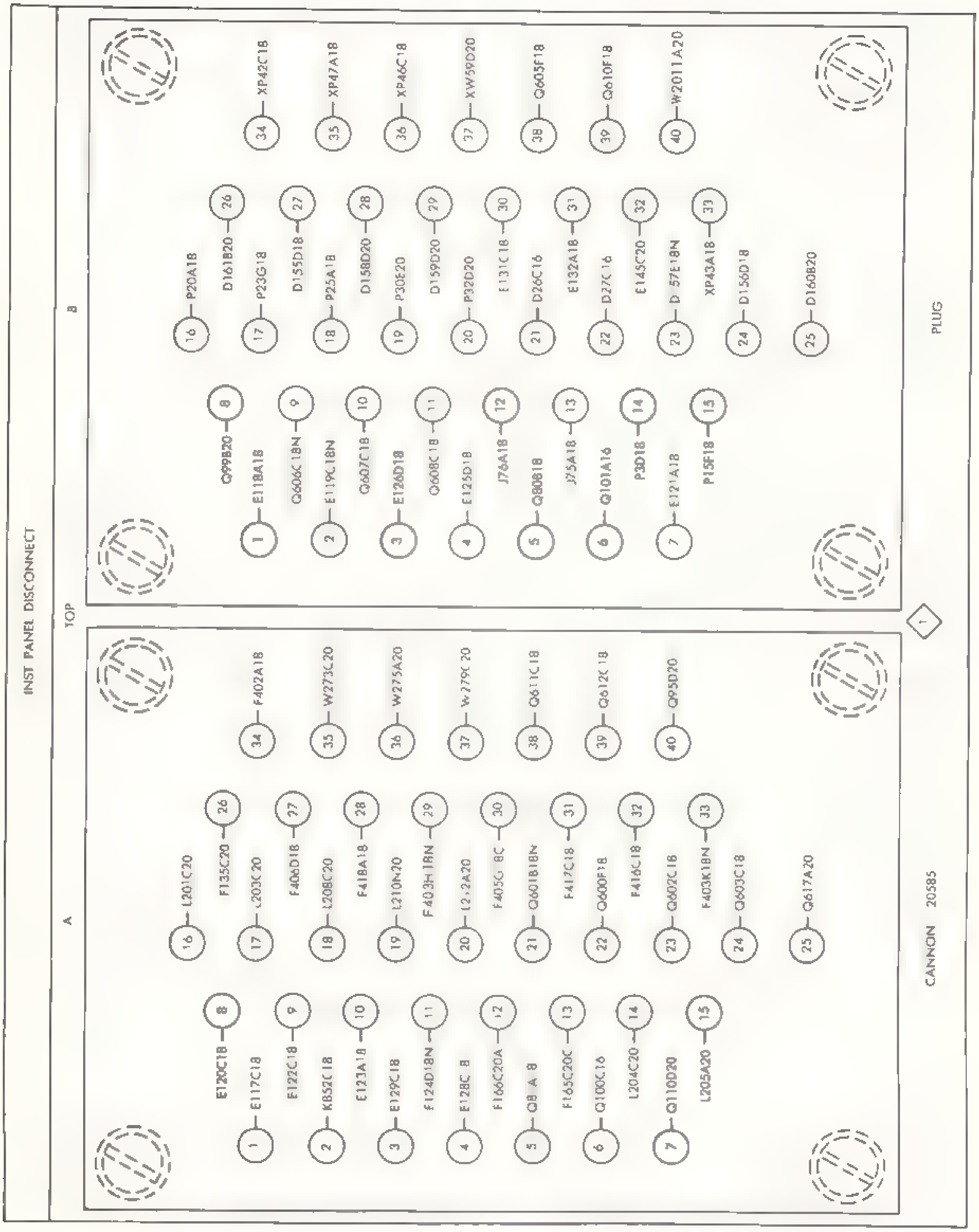


Figure 12—197. Disconnect plug and receptacle chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 1 of 8)

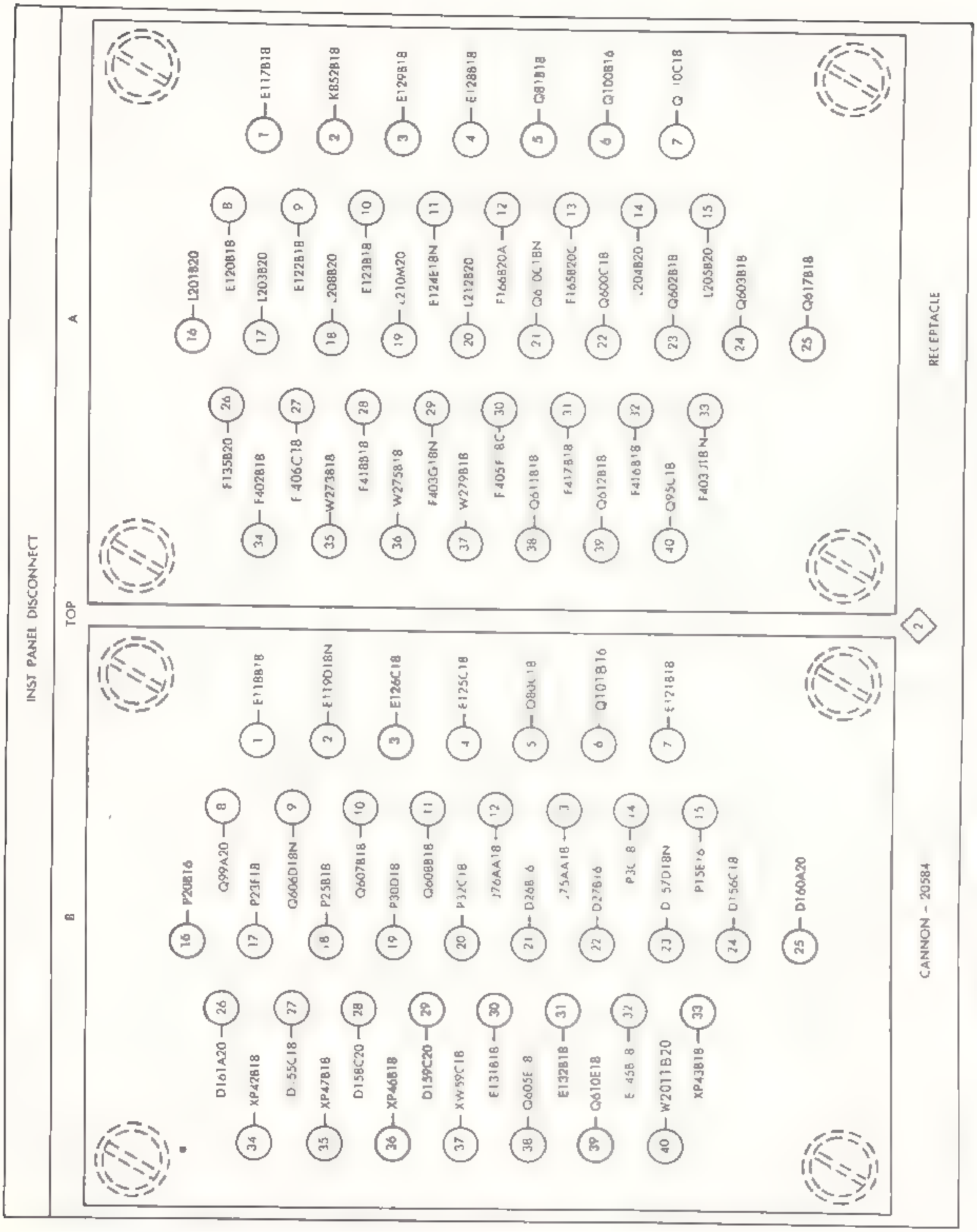
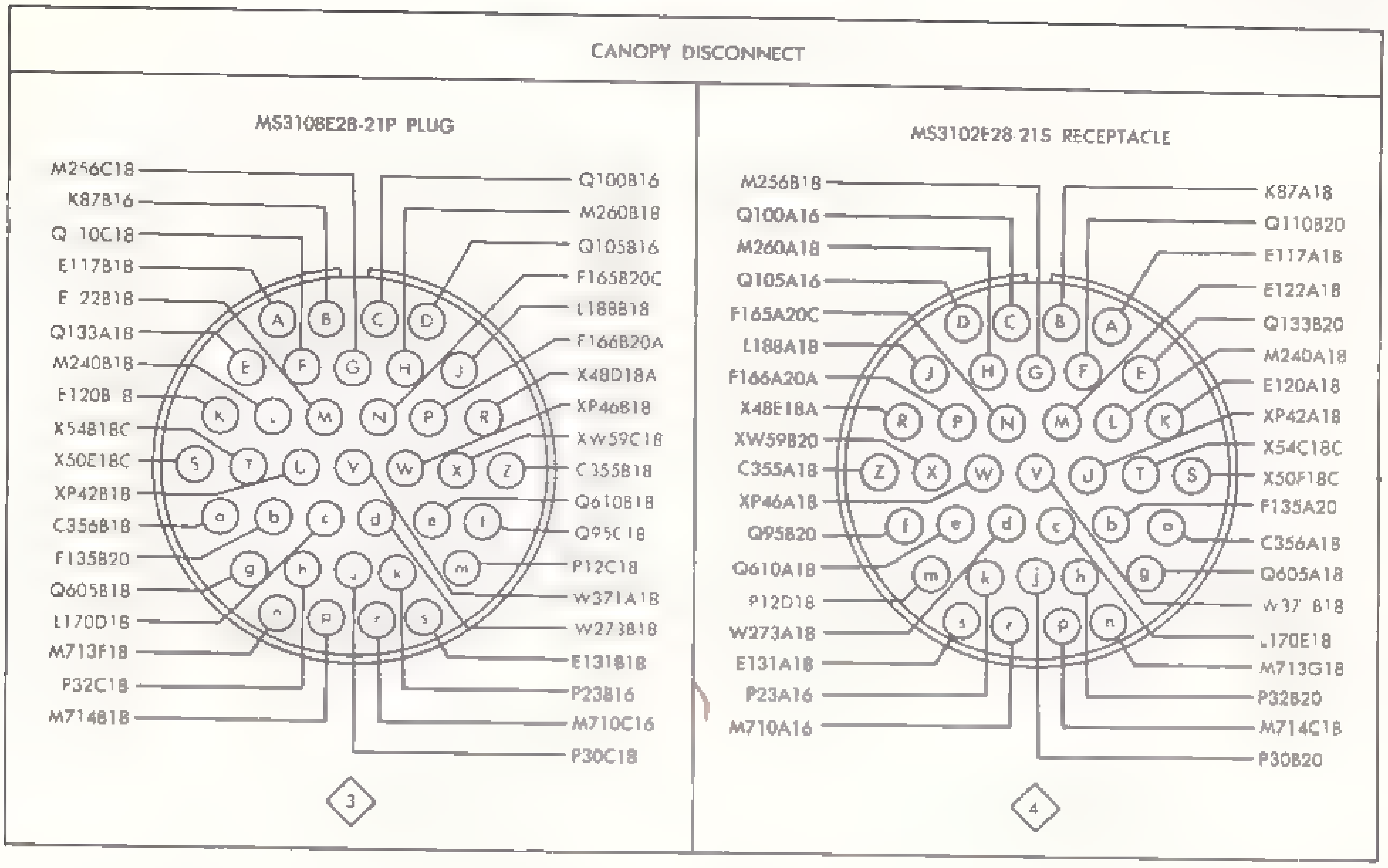


Figure 12—197. Disconnect plug and receptacle chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 2 of 8)



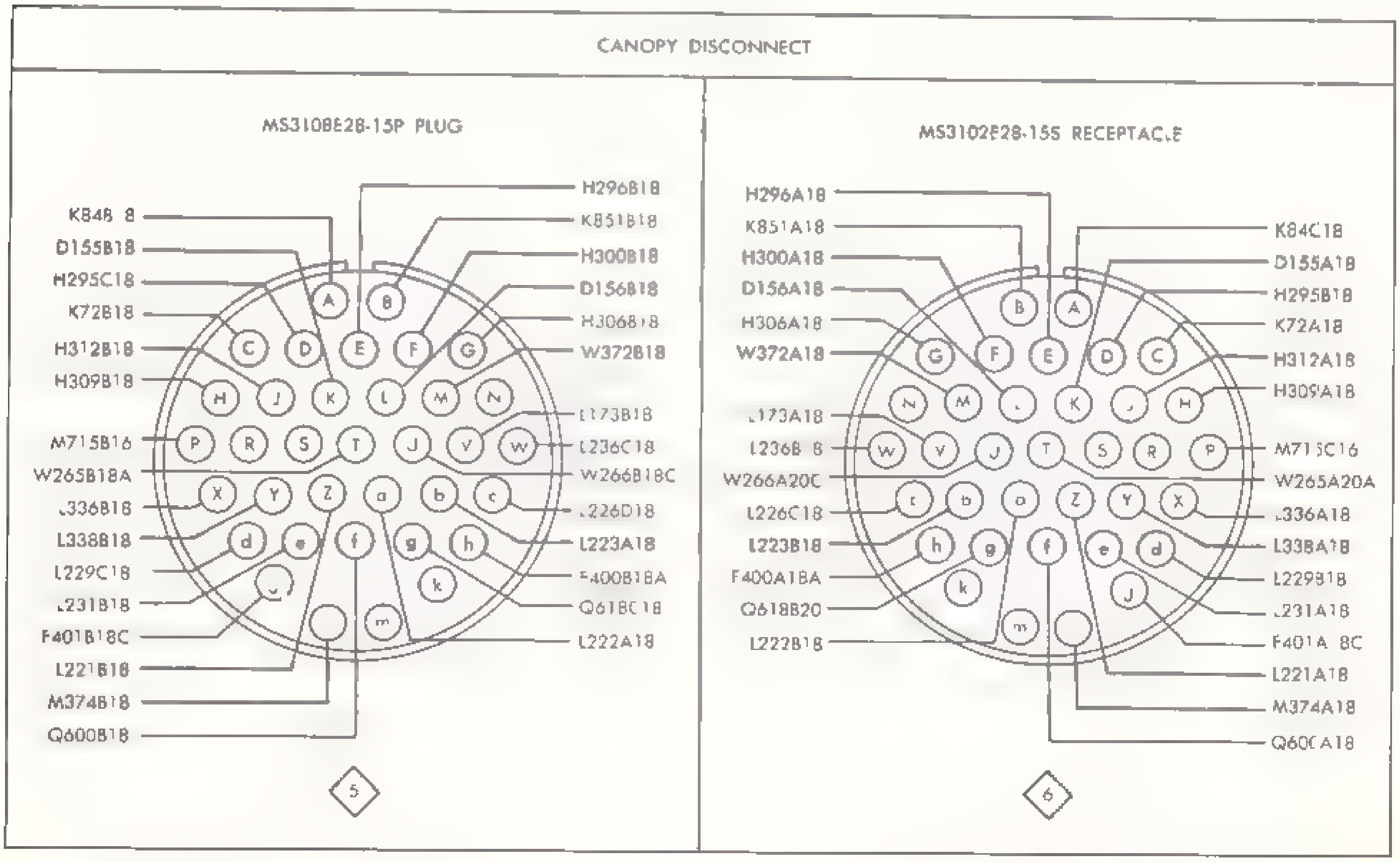


Figure 12—197. Disconnect plug and receptacle chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 3 of 8)

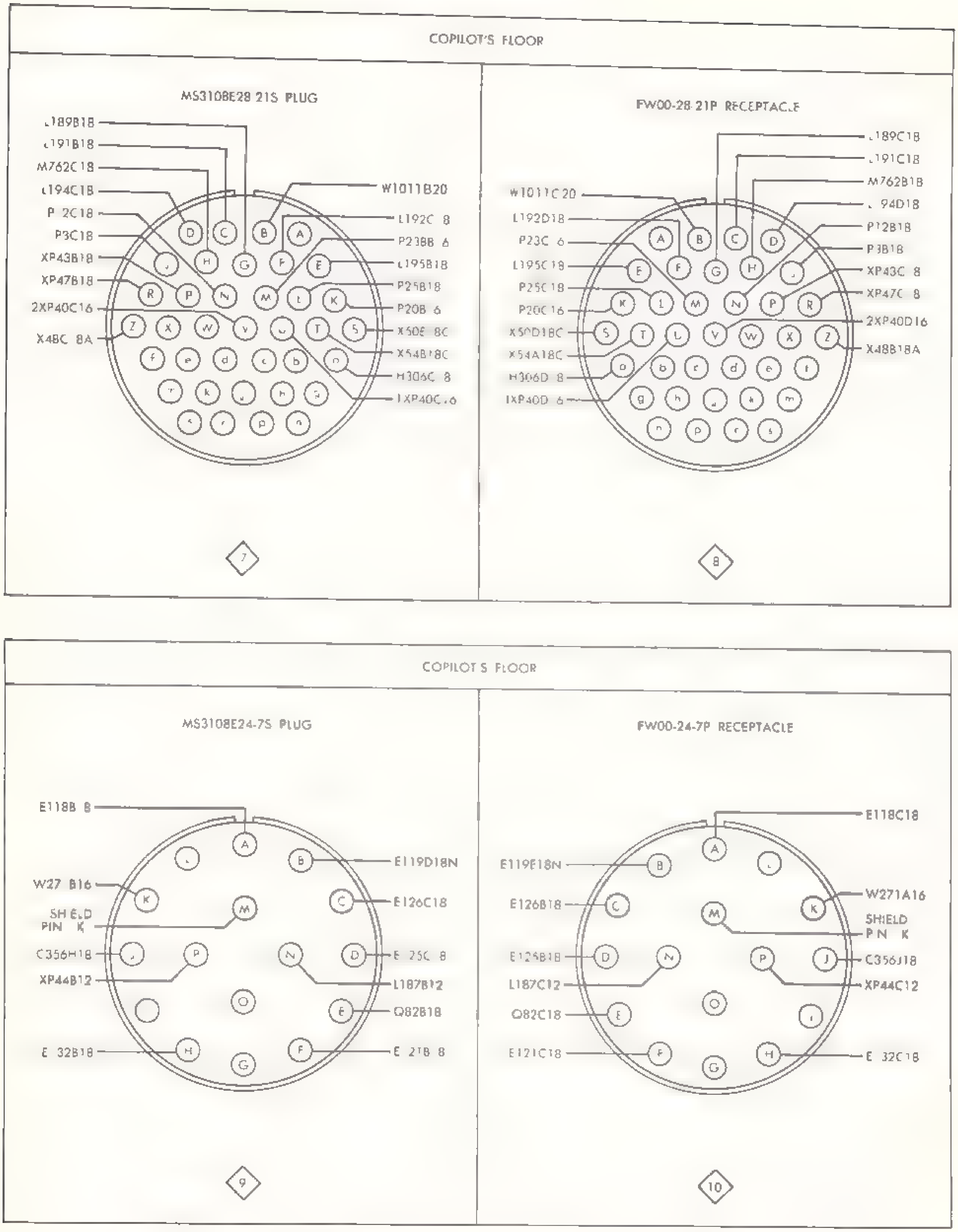


Figure 12–197. Disconnect plug and receptacle chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 4 of 8)

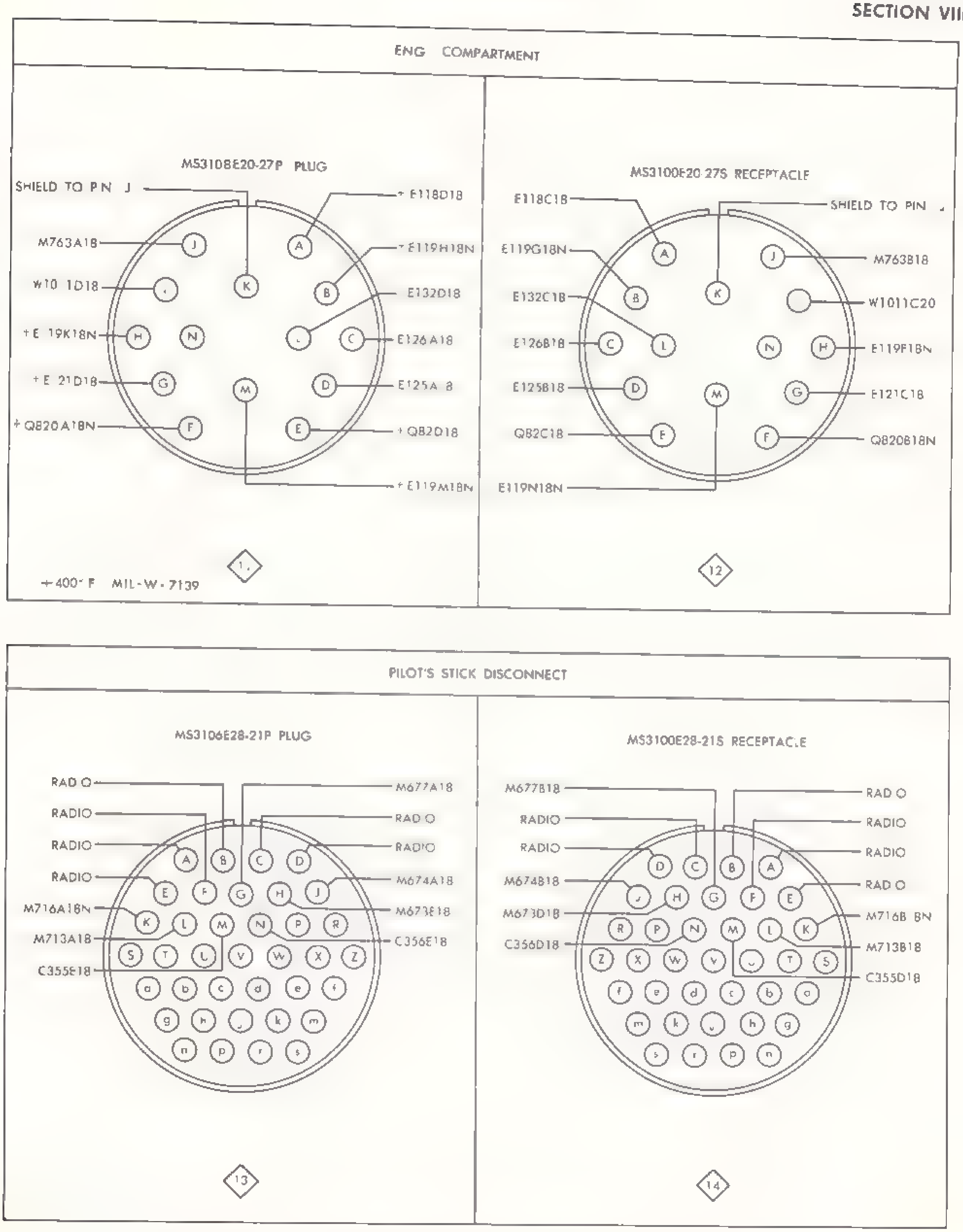


Figure 12–197. Disconnect plug and receptacle chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 5 of 8)

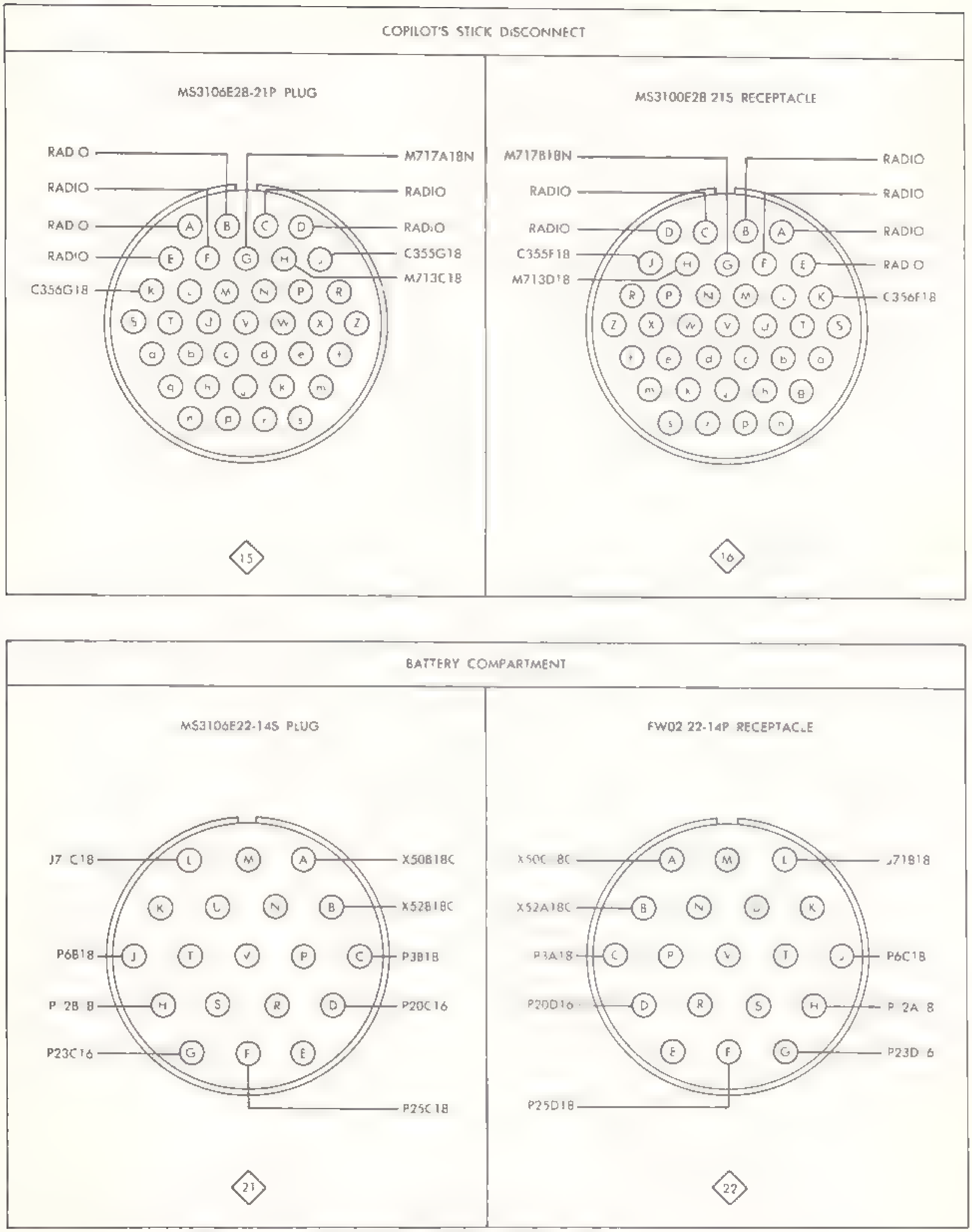


Figure 12–197. Disconnect plug and receptacle chart – electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 6 of 8)

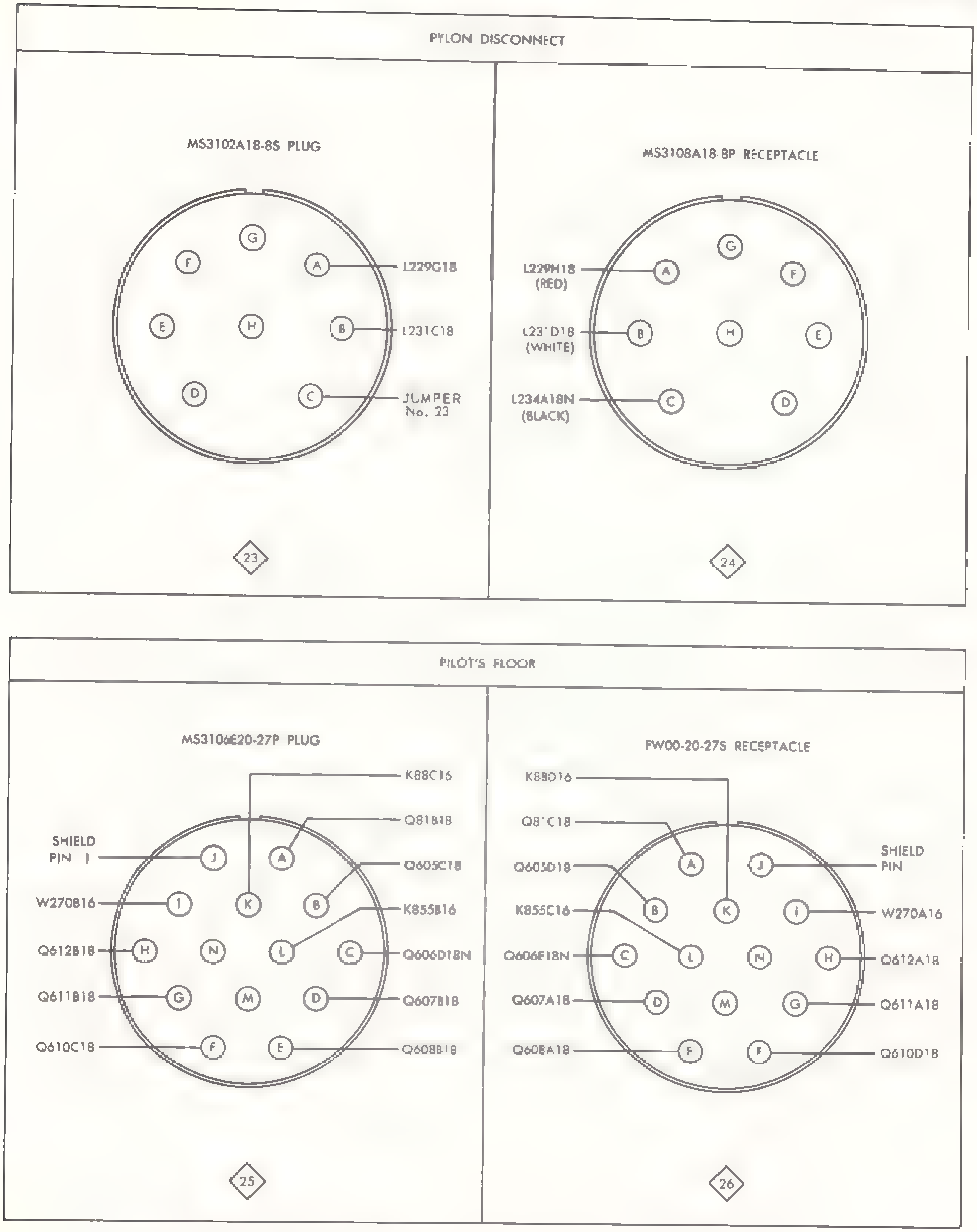
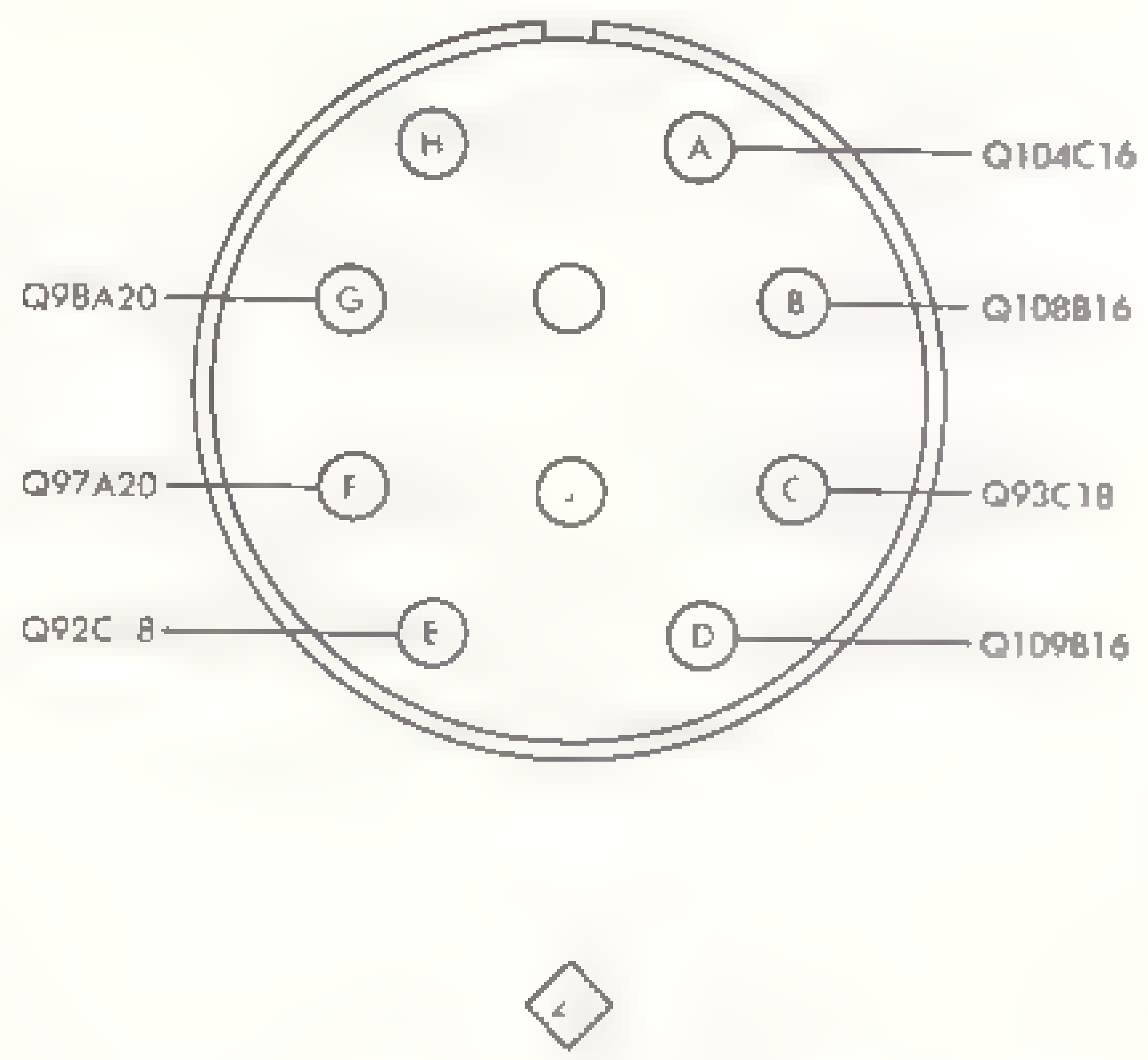


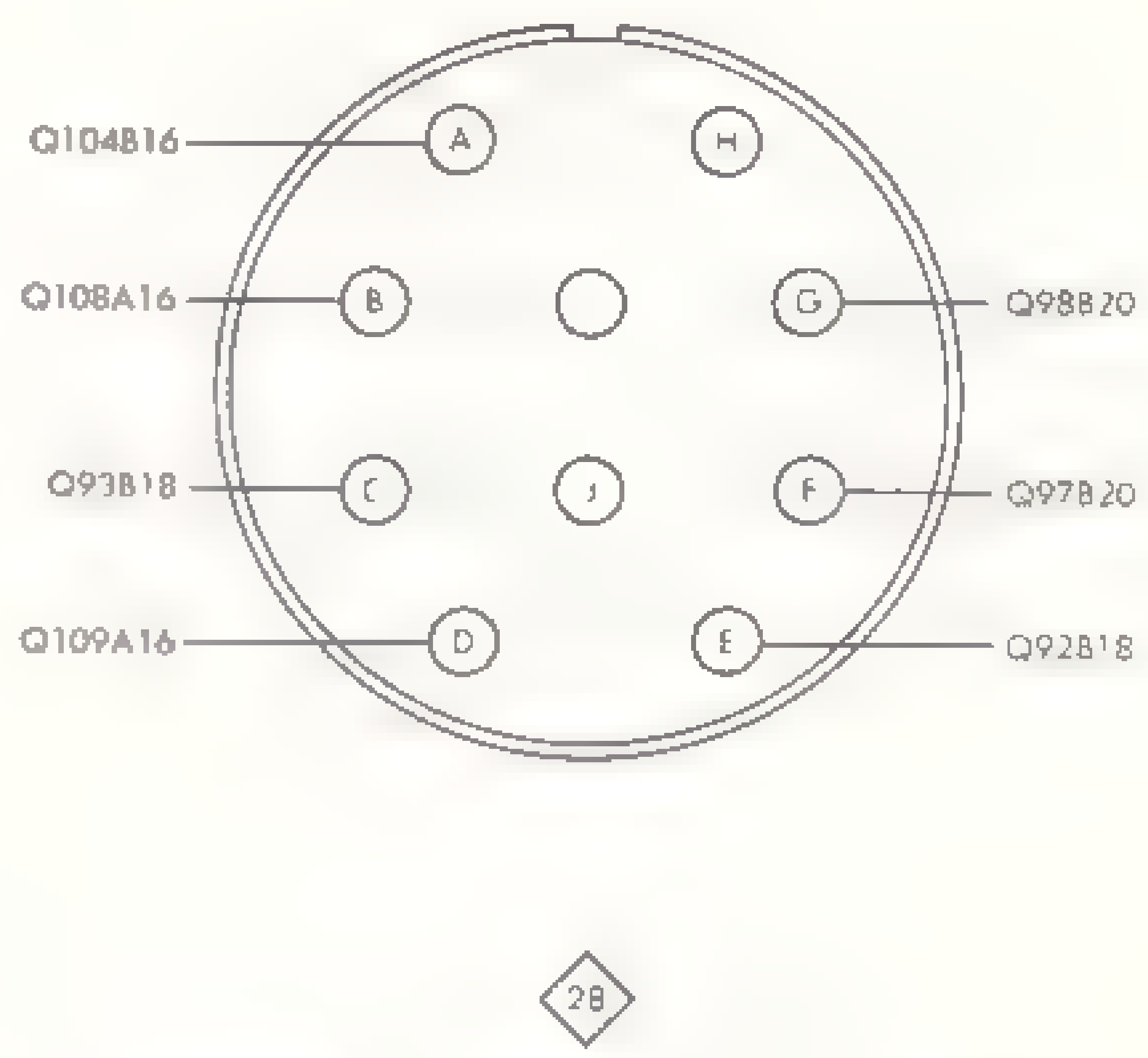
Figure 12—197. Disconnect plug and receptacle chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 7 of 8)

LONGERON STA 93

MS3102E18-1P RECEPTACLE

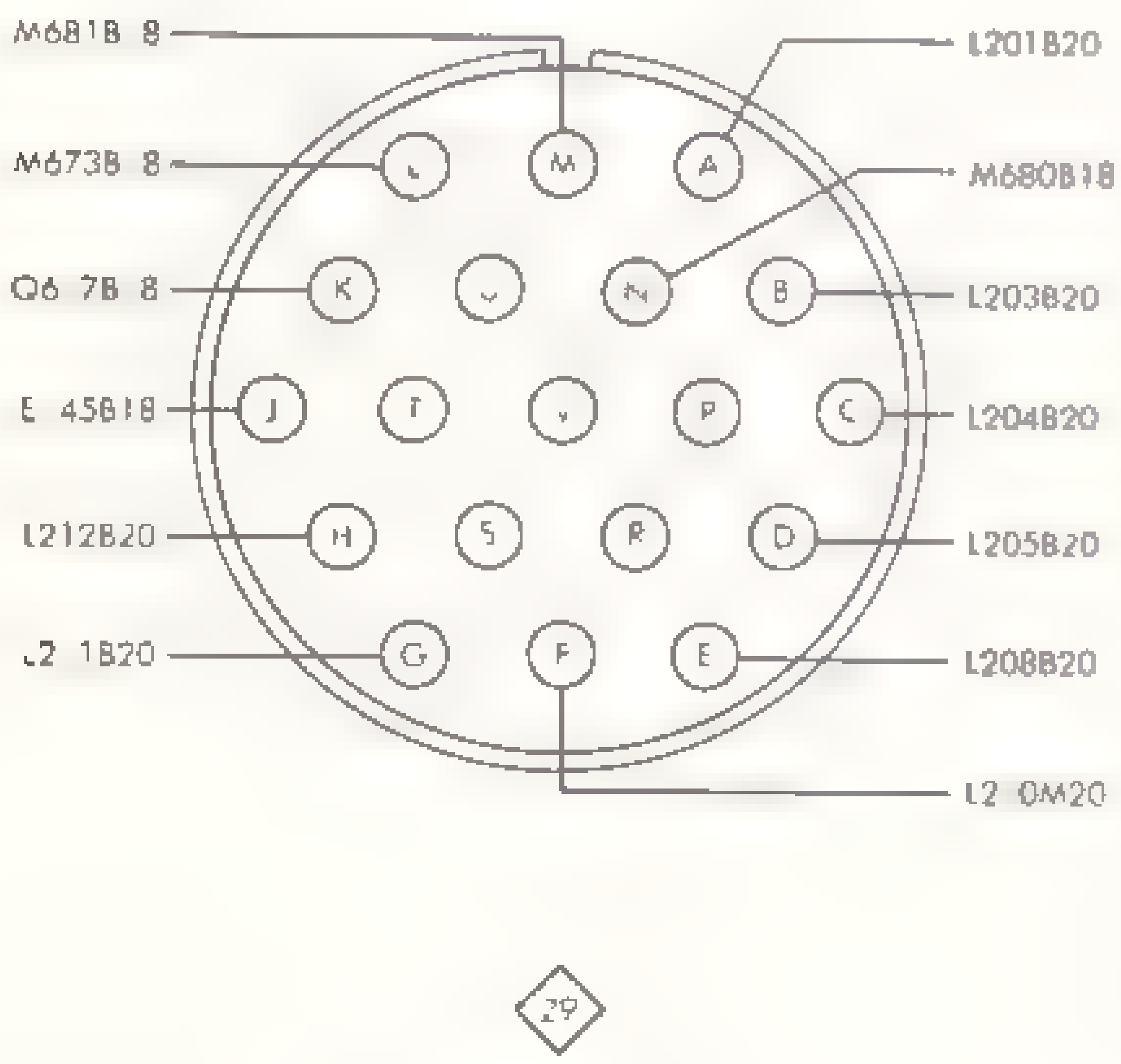


MS3106E-18-15 PLUG



CANOPY DISCONNECT

MS3108E22-14P PLUG



MS3100E22-14S RECEPTACLE

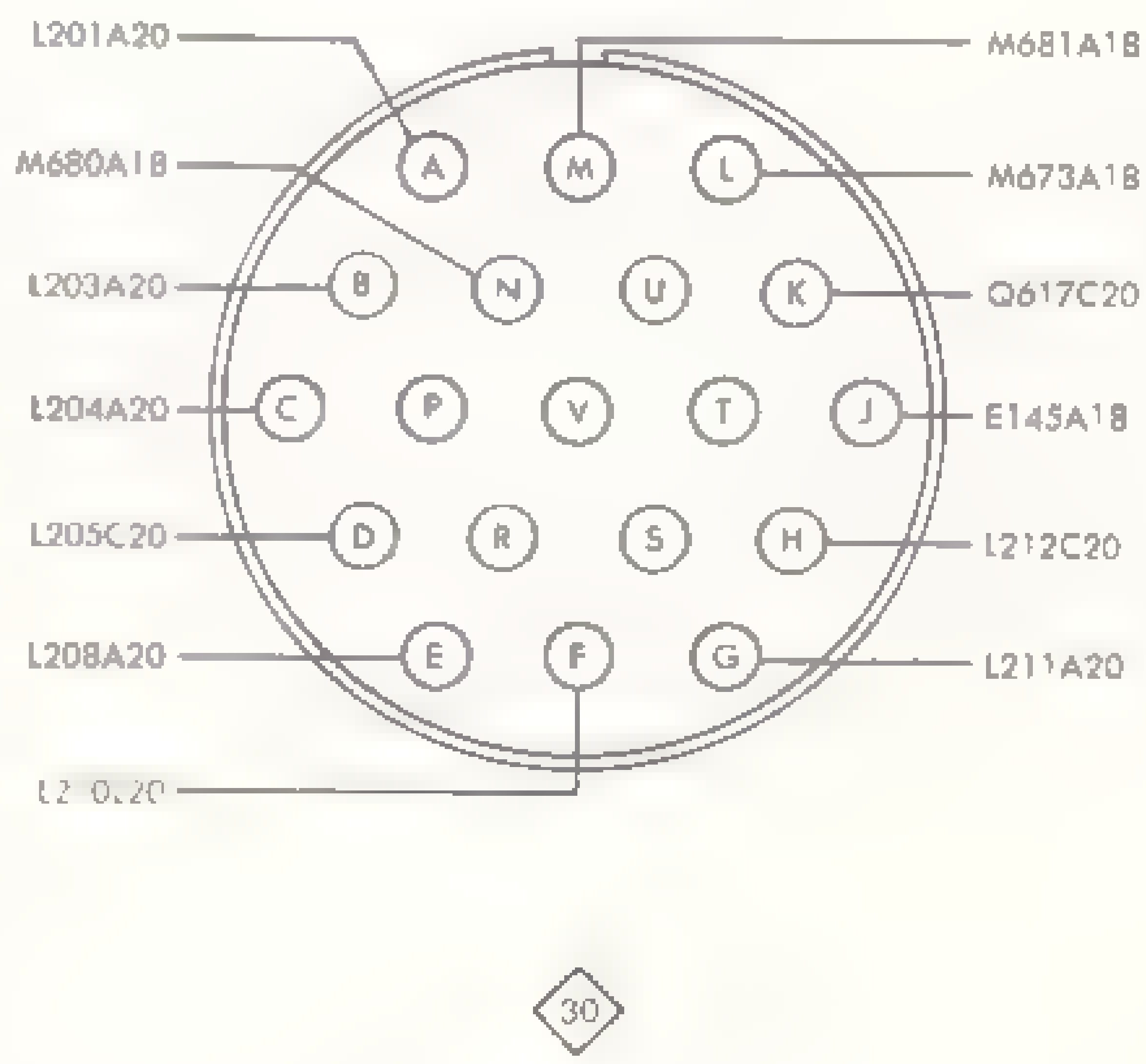


Figure 12—197. Disconnect plug and receptacle chart — electrical (model CH-34A serial No. 56-4313 through 57-1741) (Sheet 8 of 8)

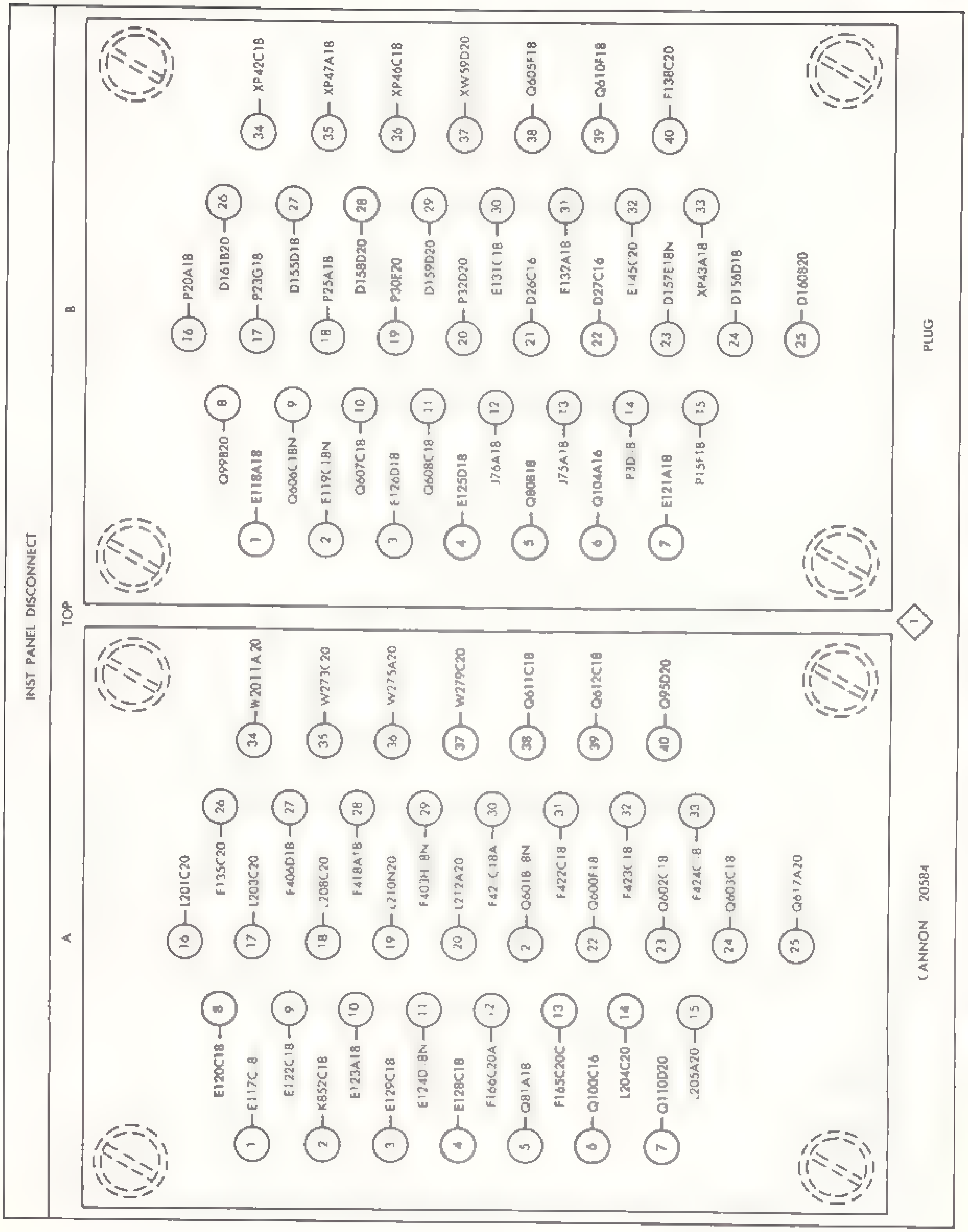


Figure 12–198. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 1 of 8)

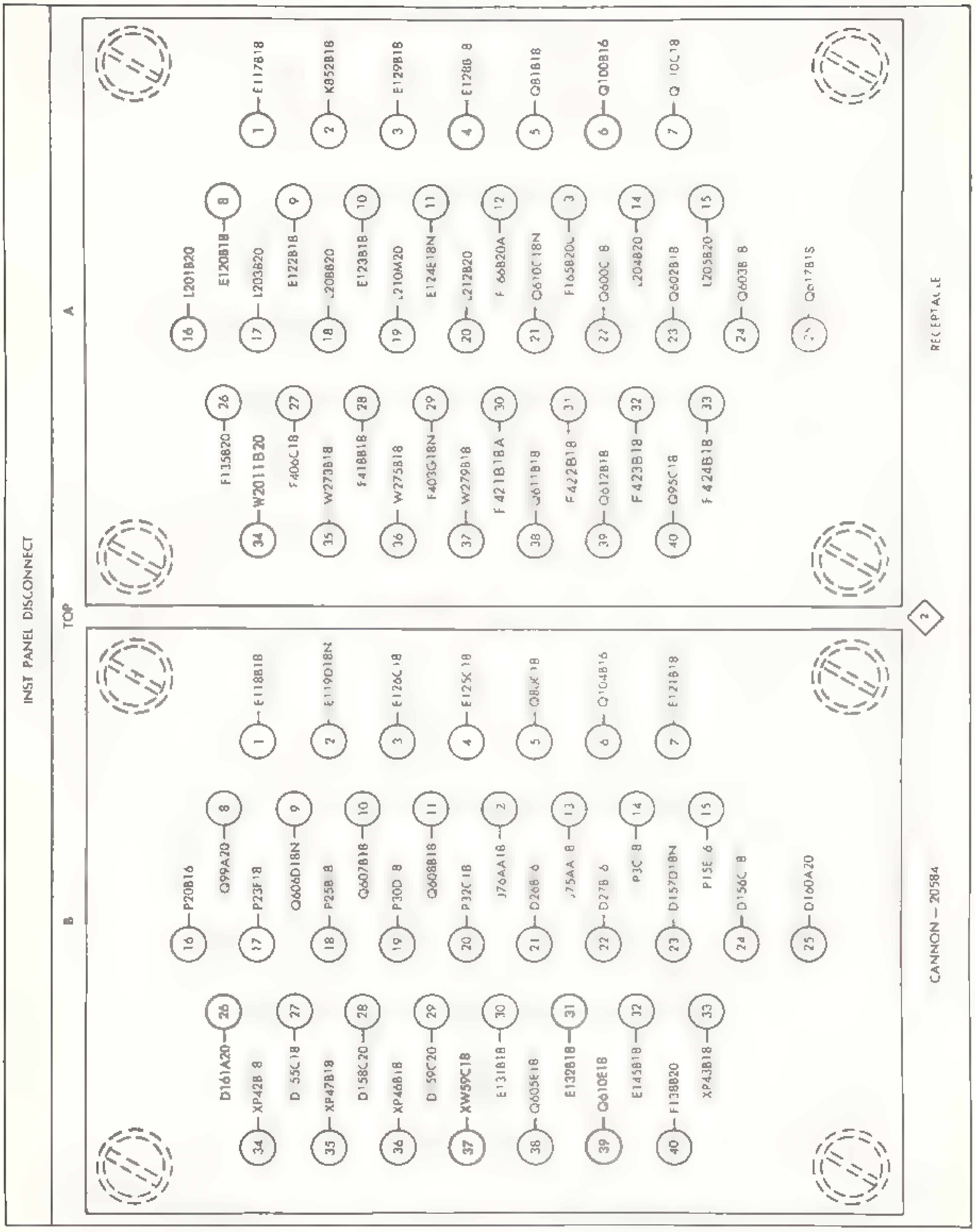


Figure 12–198. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 2 of 8)

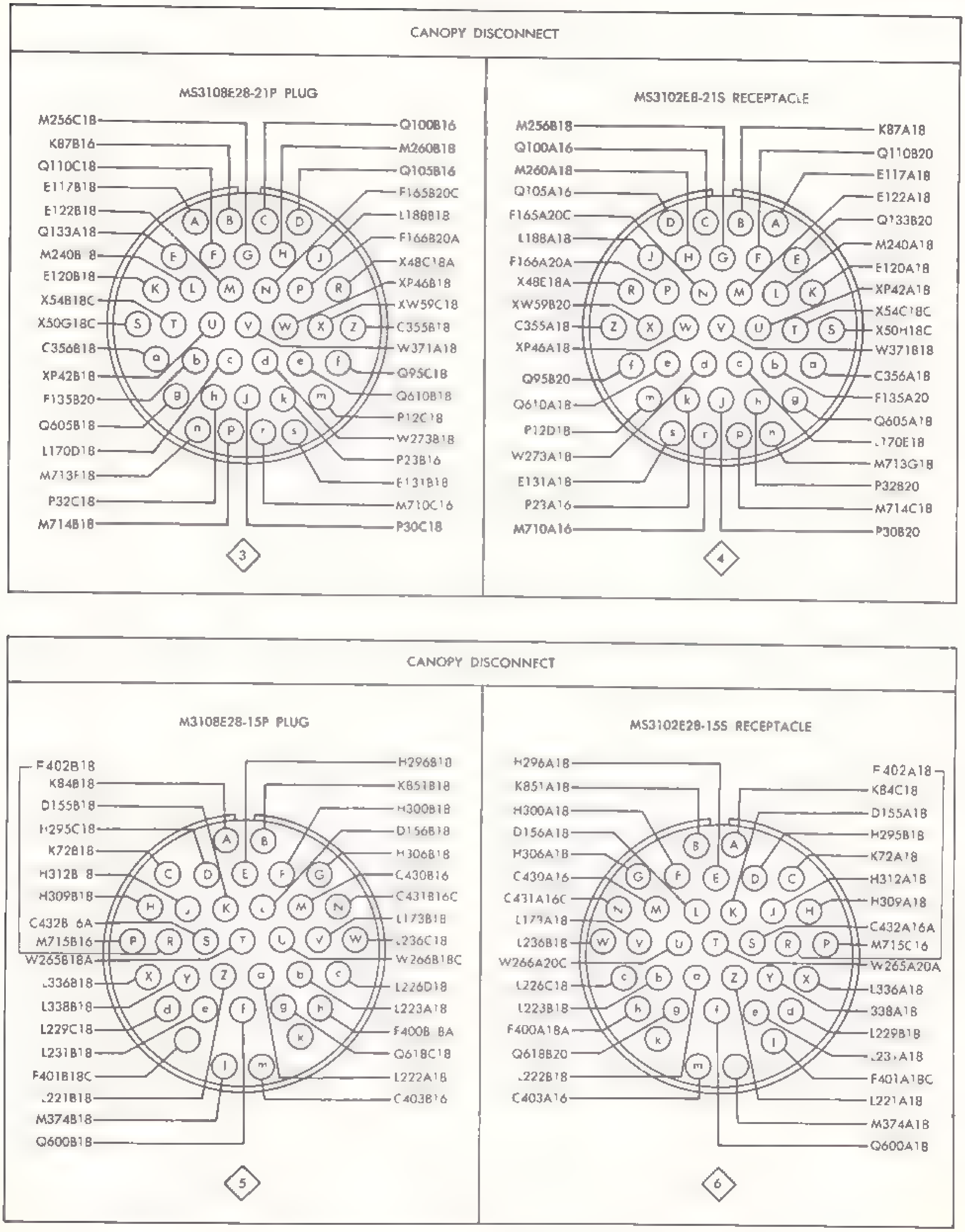
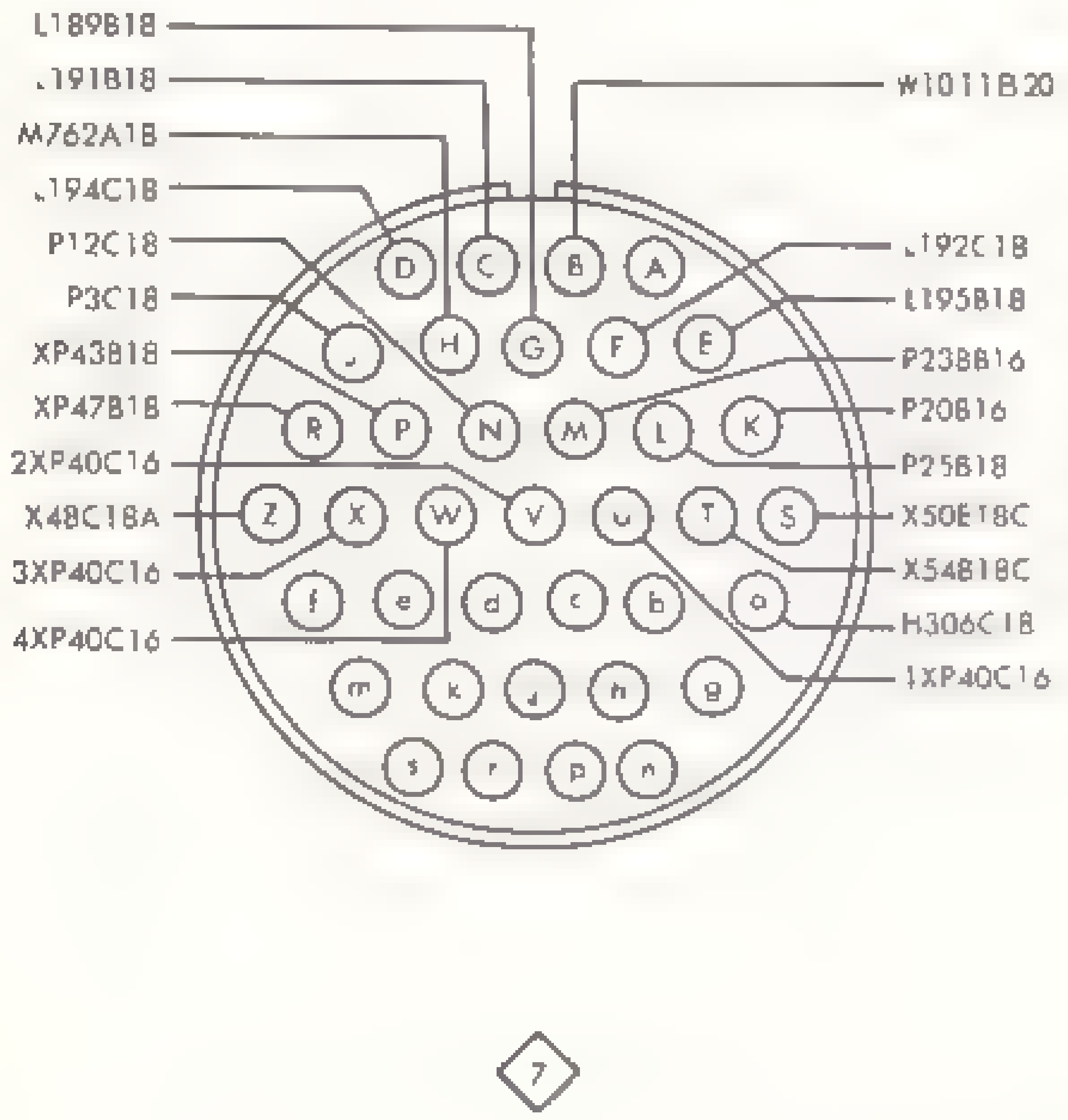


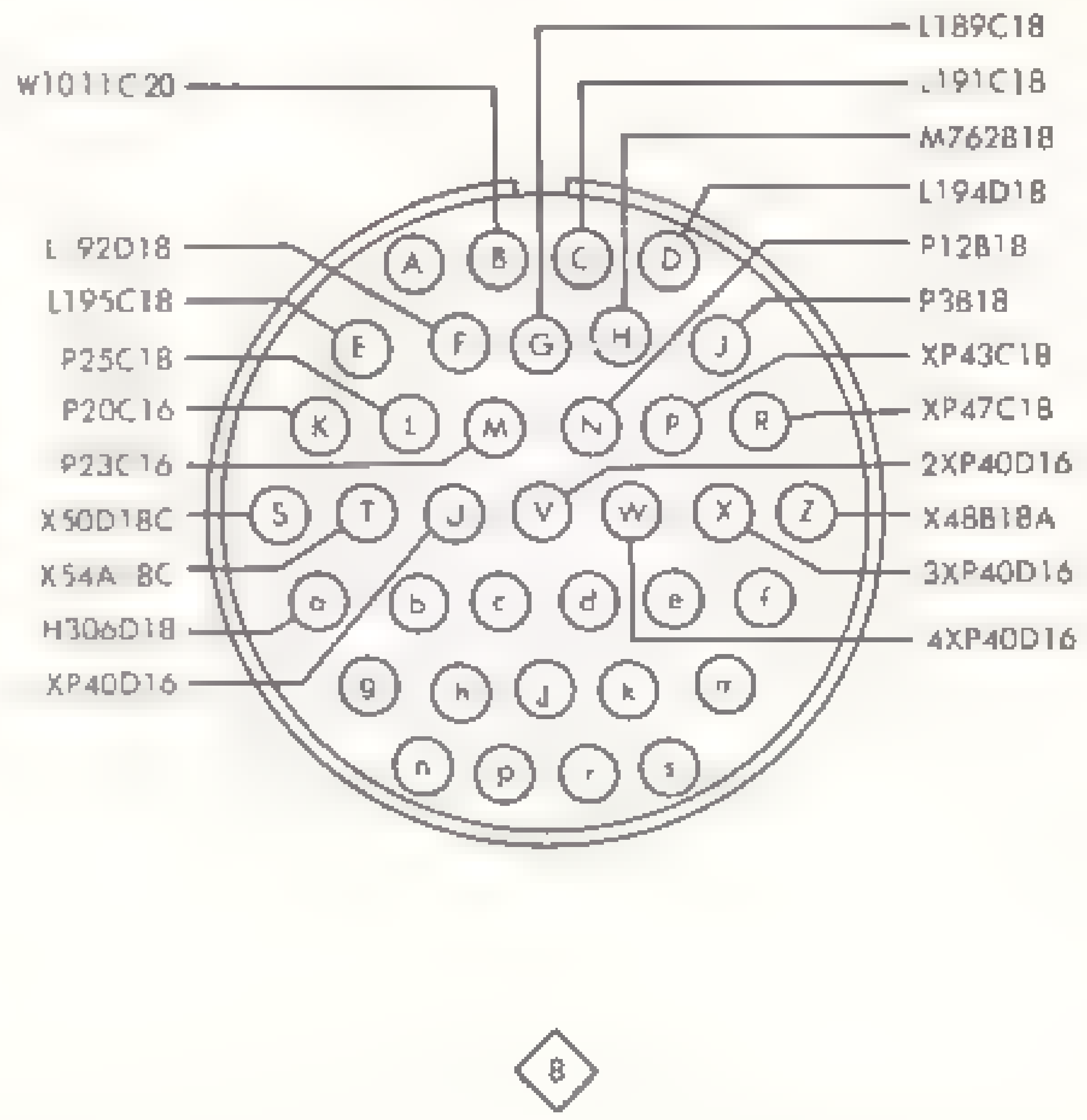
Figure 12–198. Disconnect plug and receptacle chart – electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 3 of 8)

PILOT'S FLOOR

MS3108E28-21S PLUG

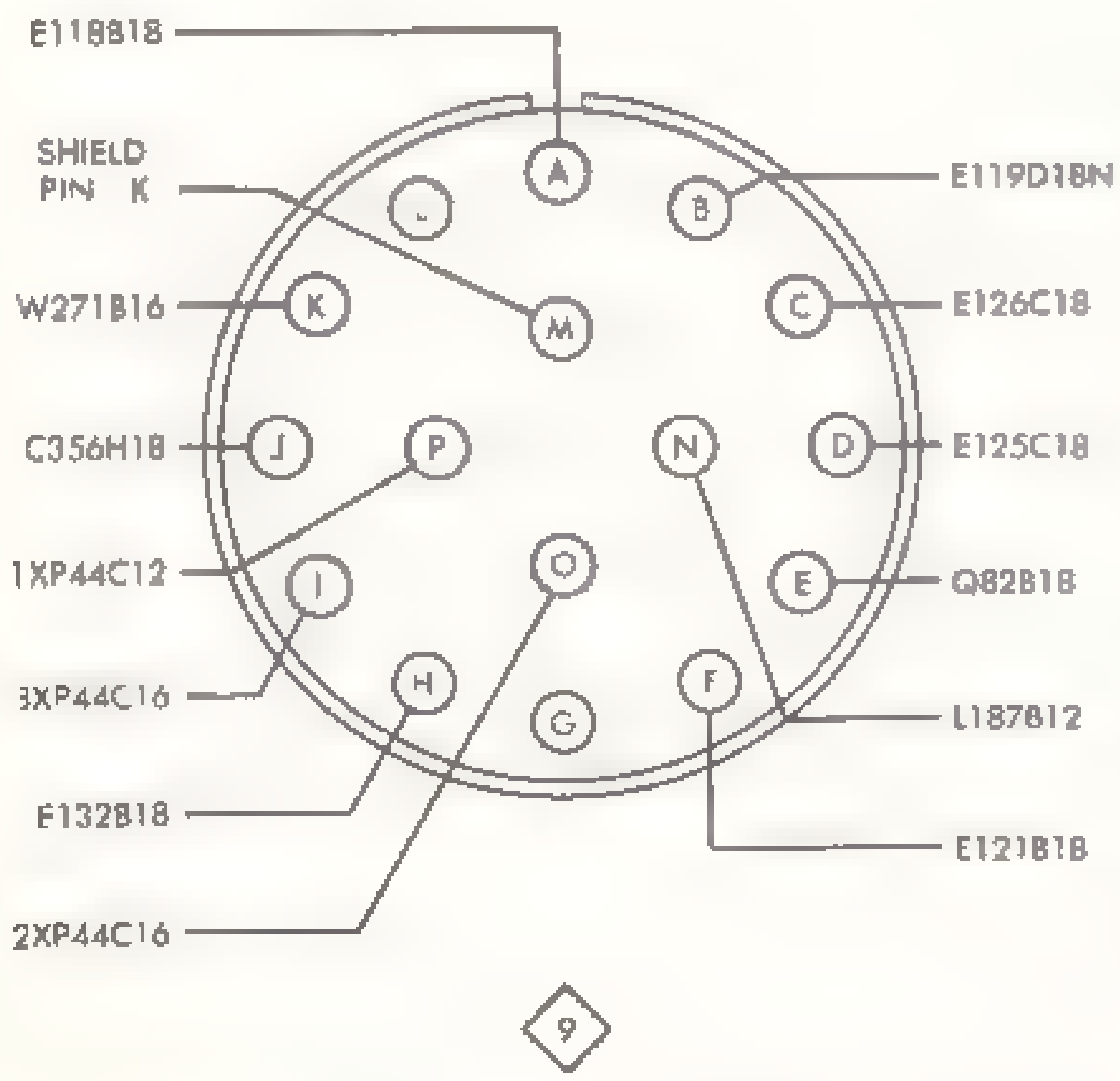


FW00-28-21P RECEPTACLE



COPILOT'S FLOOR

MS3108E24-7S PLUG



FW00-24-7P RECEPTACLE

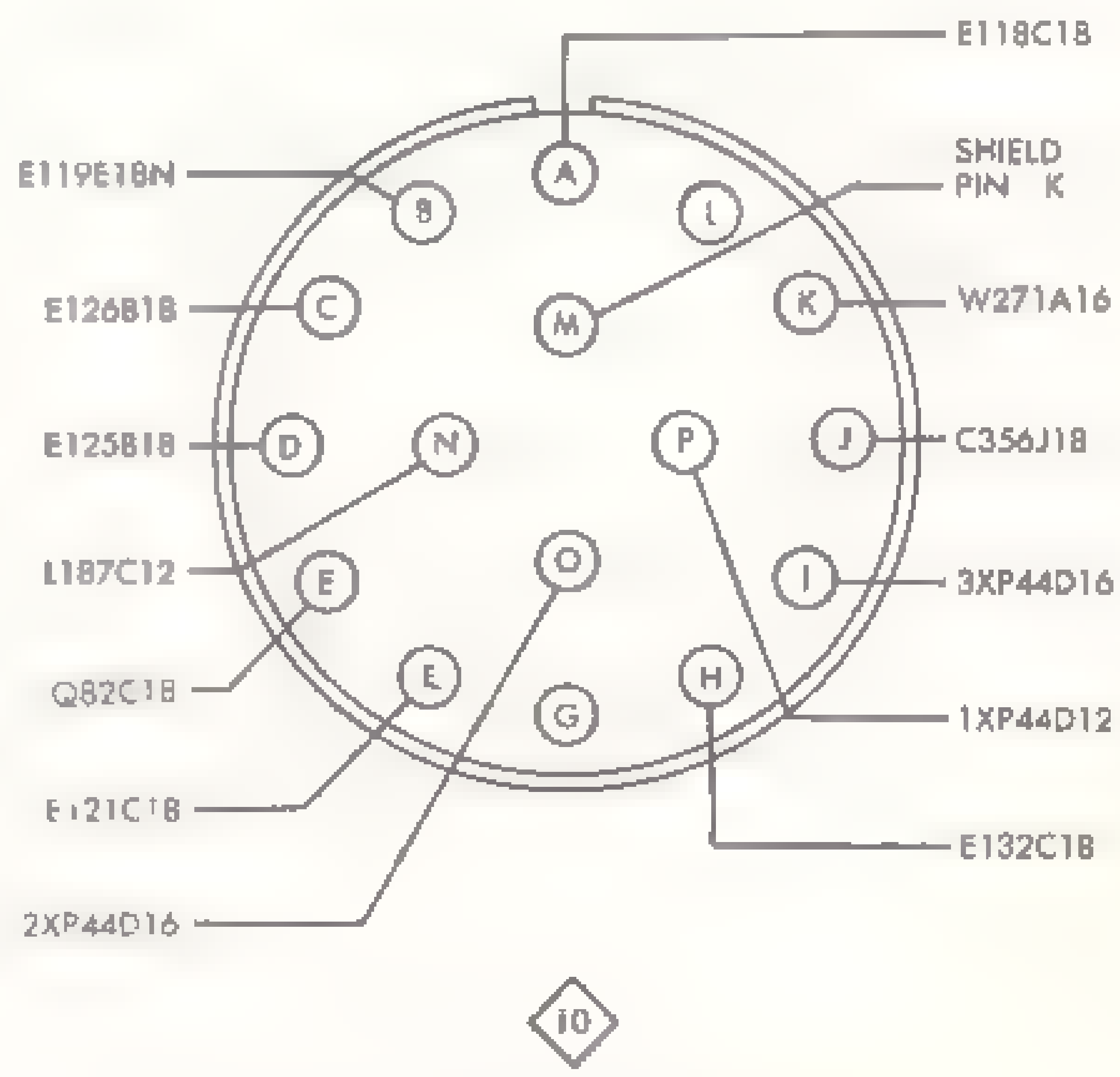


Figure 12—198. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 4 of 8)

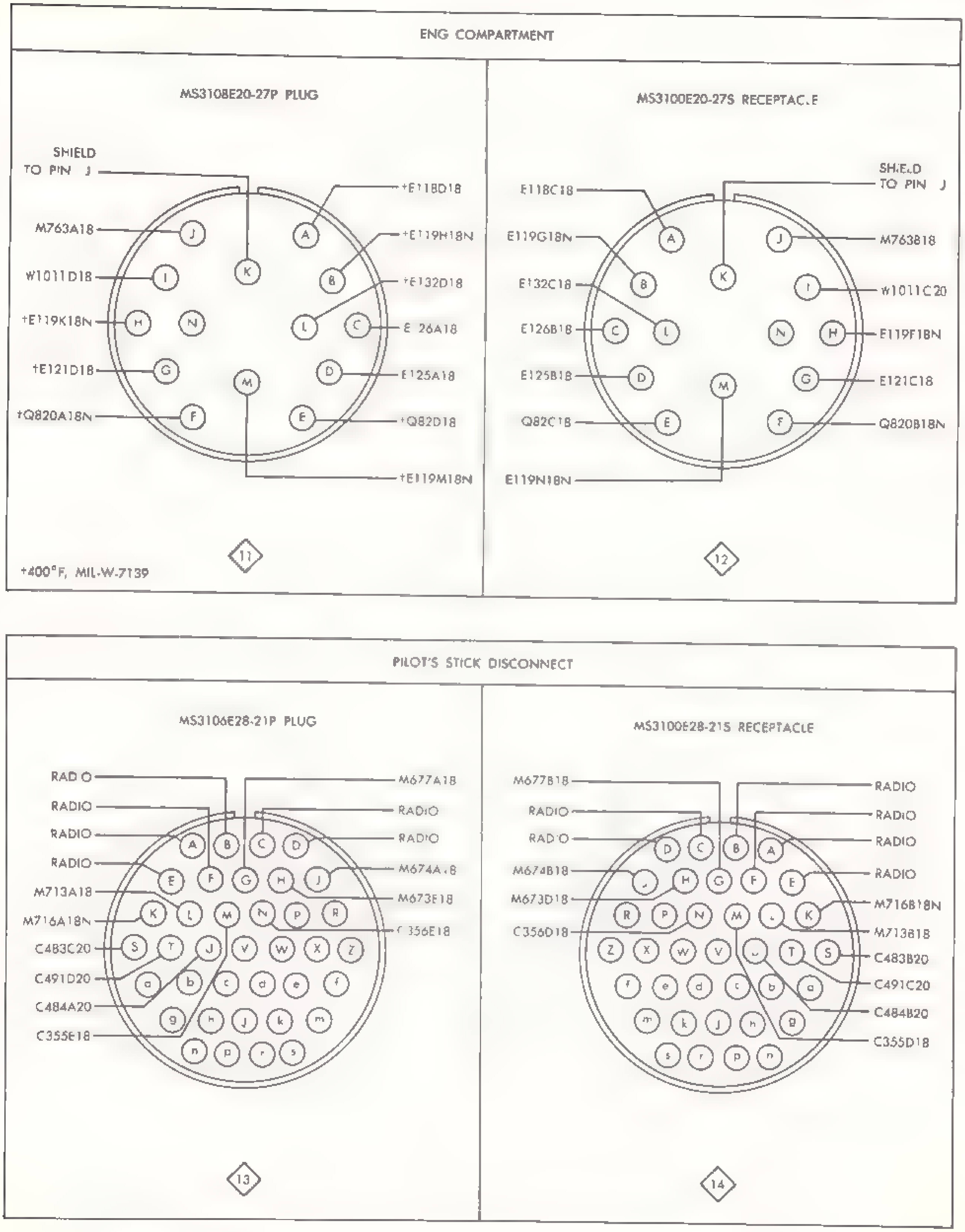
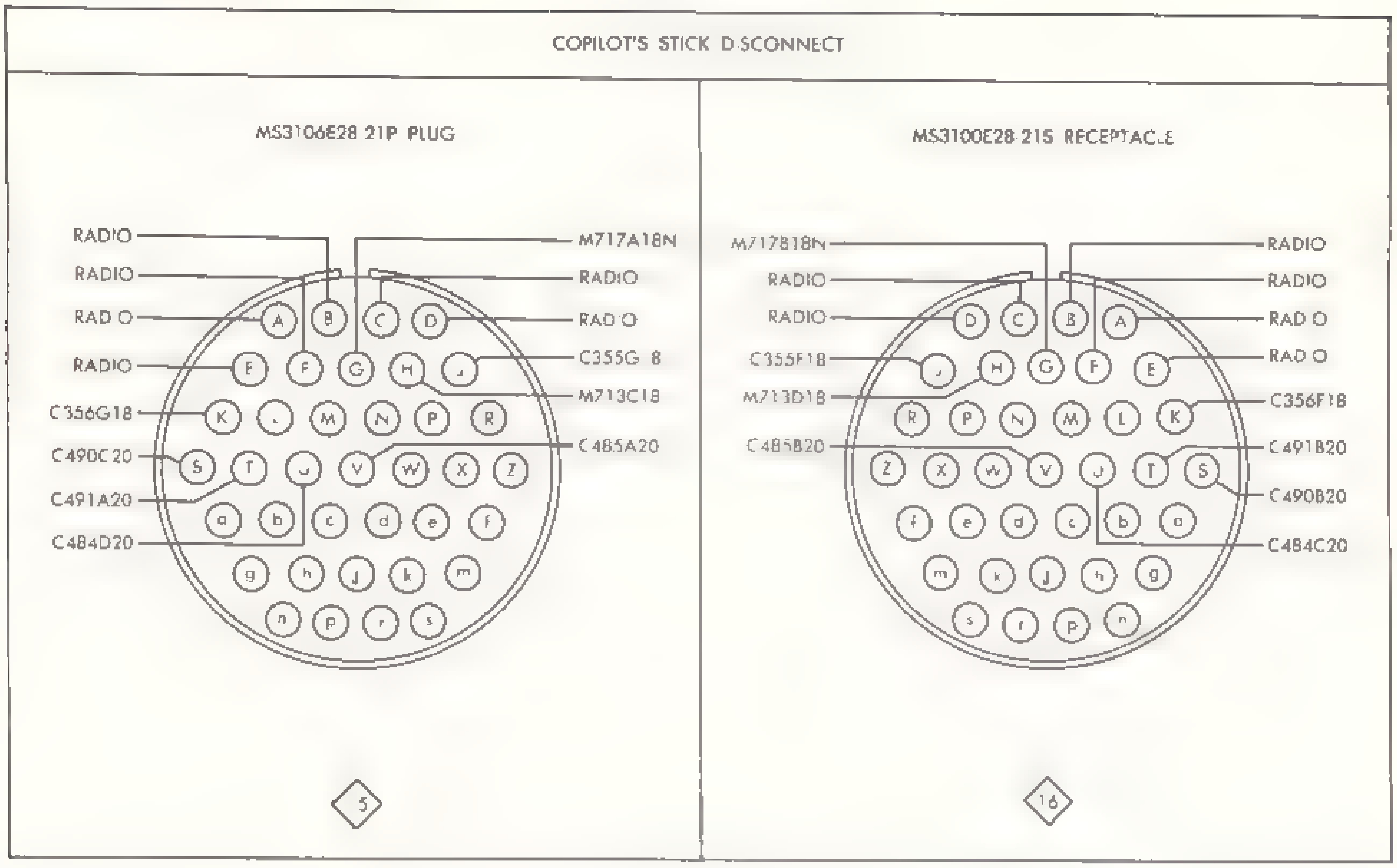


Figure 12—198. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 5 of 8)



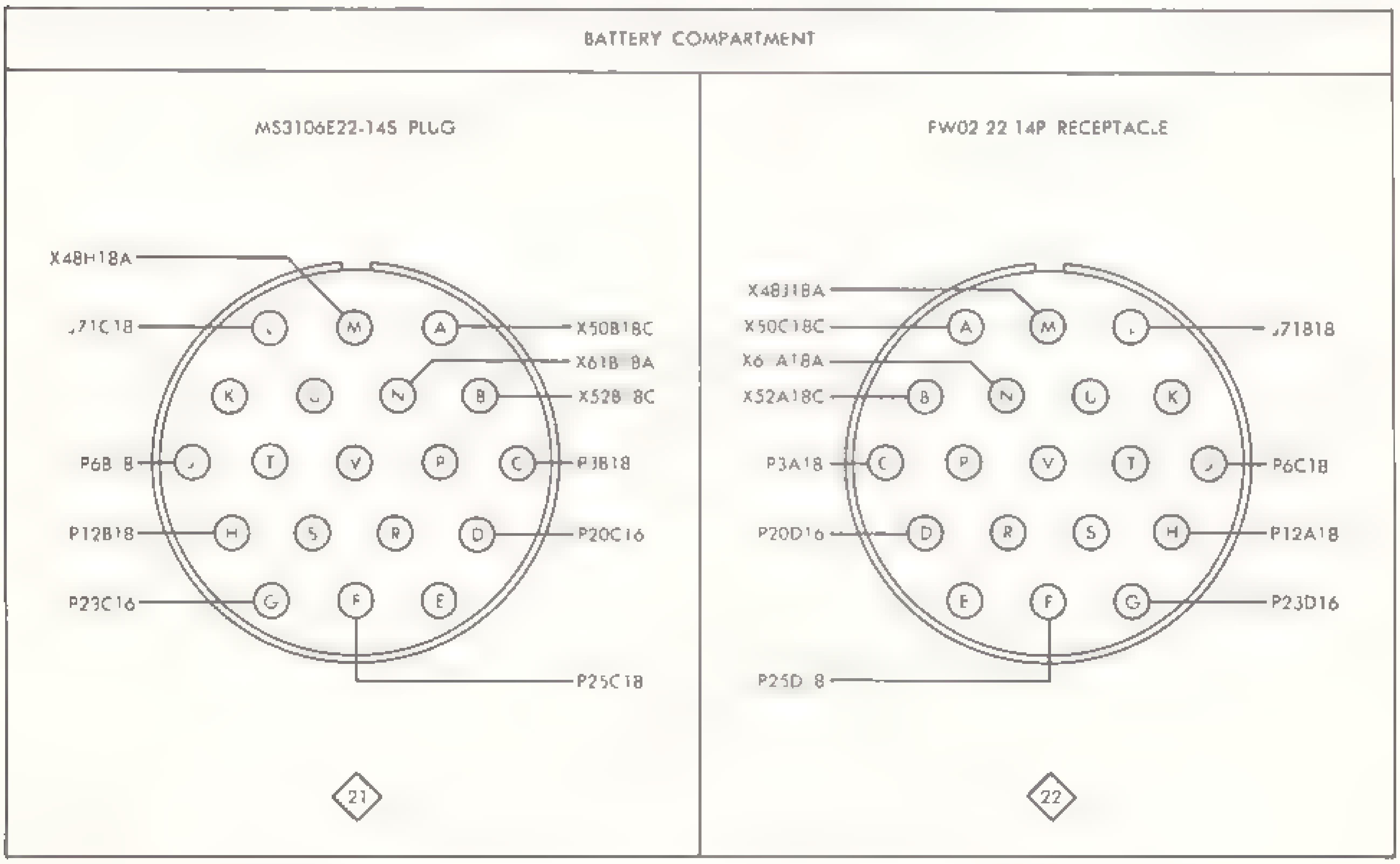


Figure 12—198. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 6 of 8)

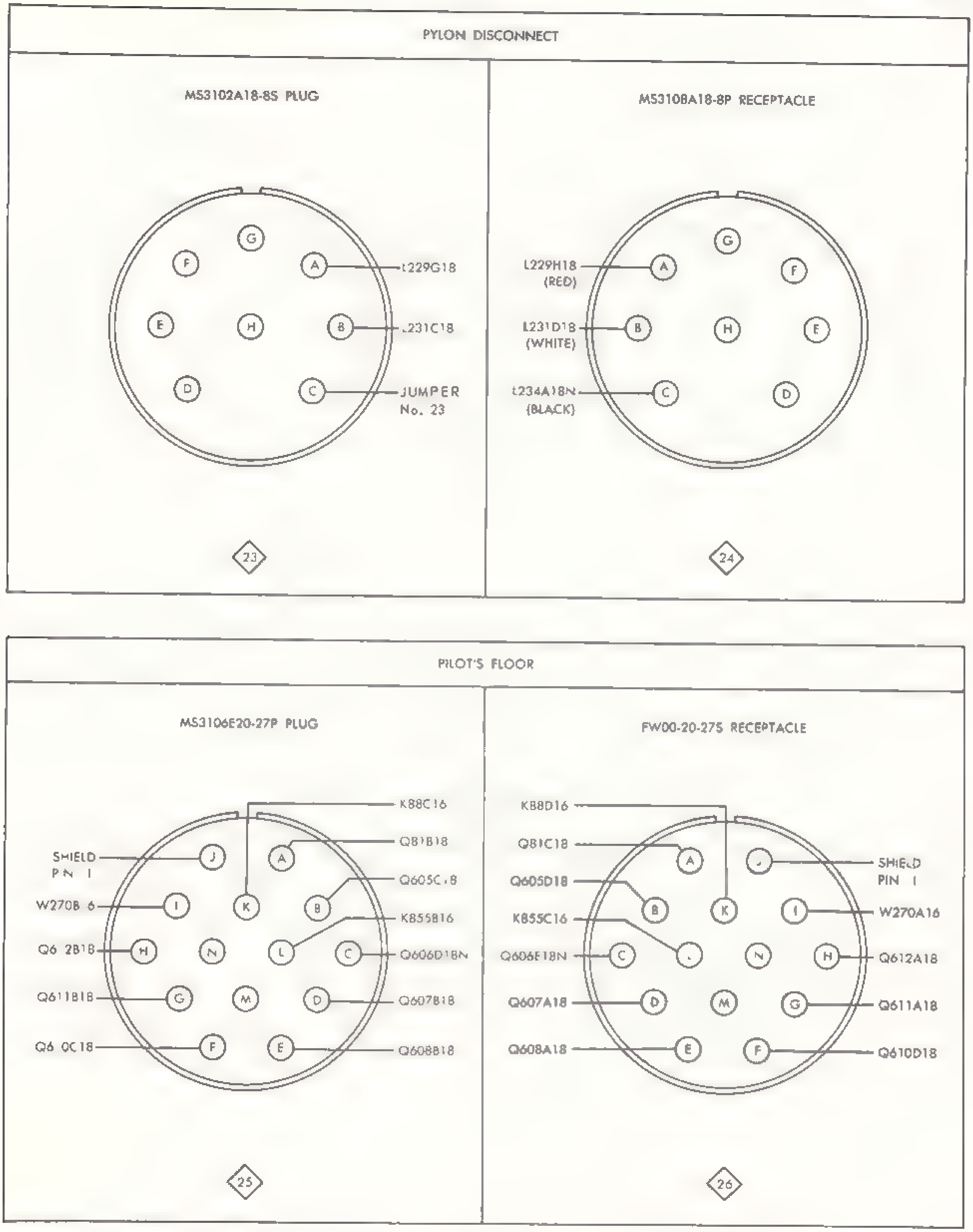


Figure 12–198. Disconnect plug and receptacle chart – electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 7 of 8)

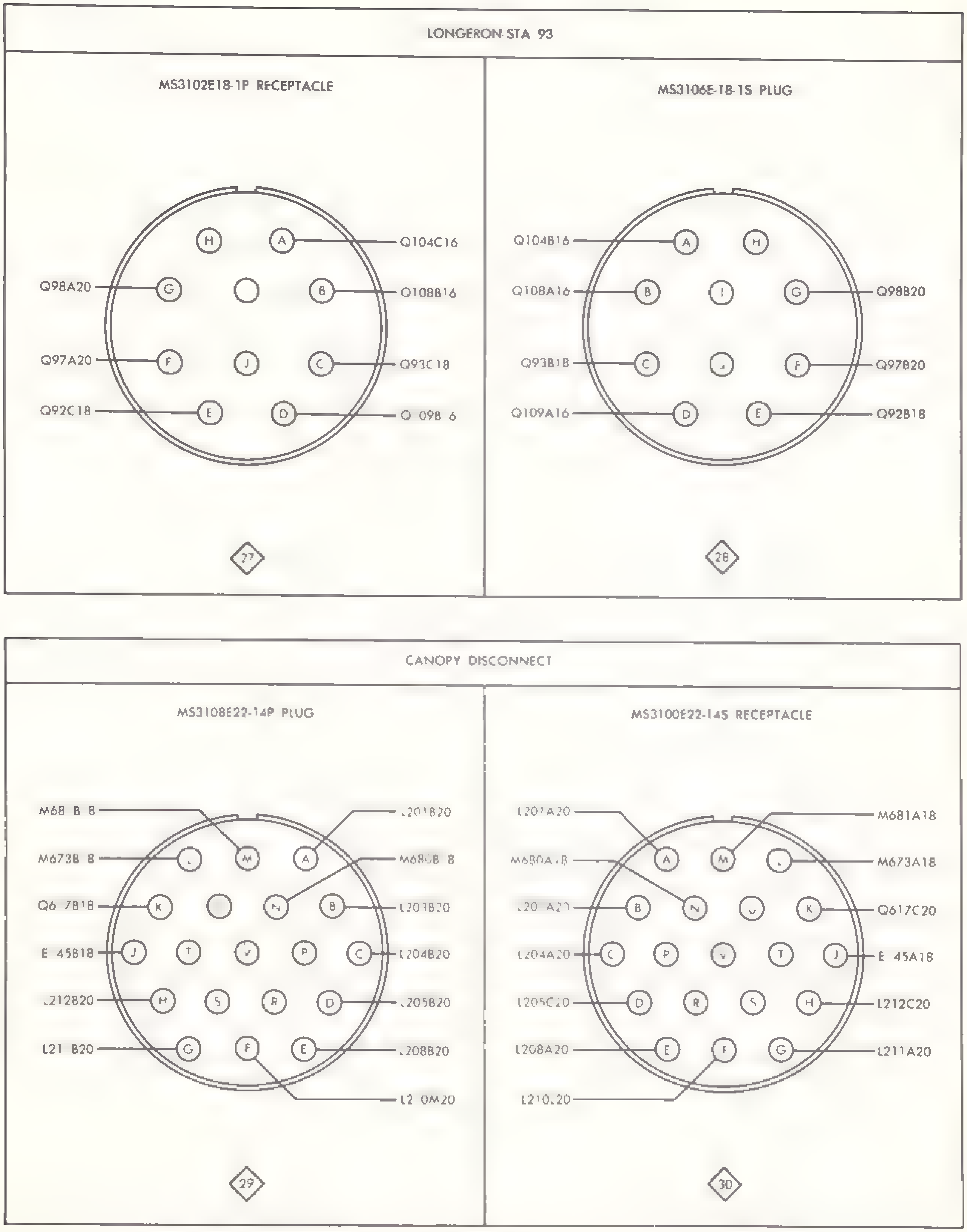


Figure 12—198. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. 57-1742 and subsequent) (Sheet 8 of 8)

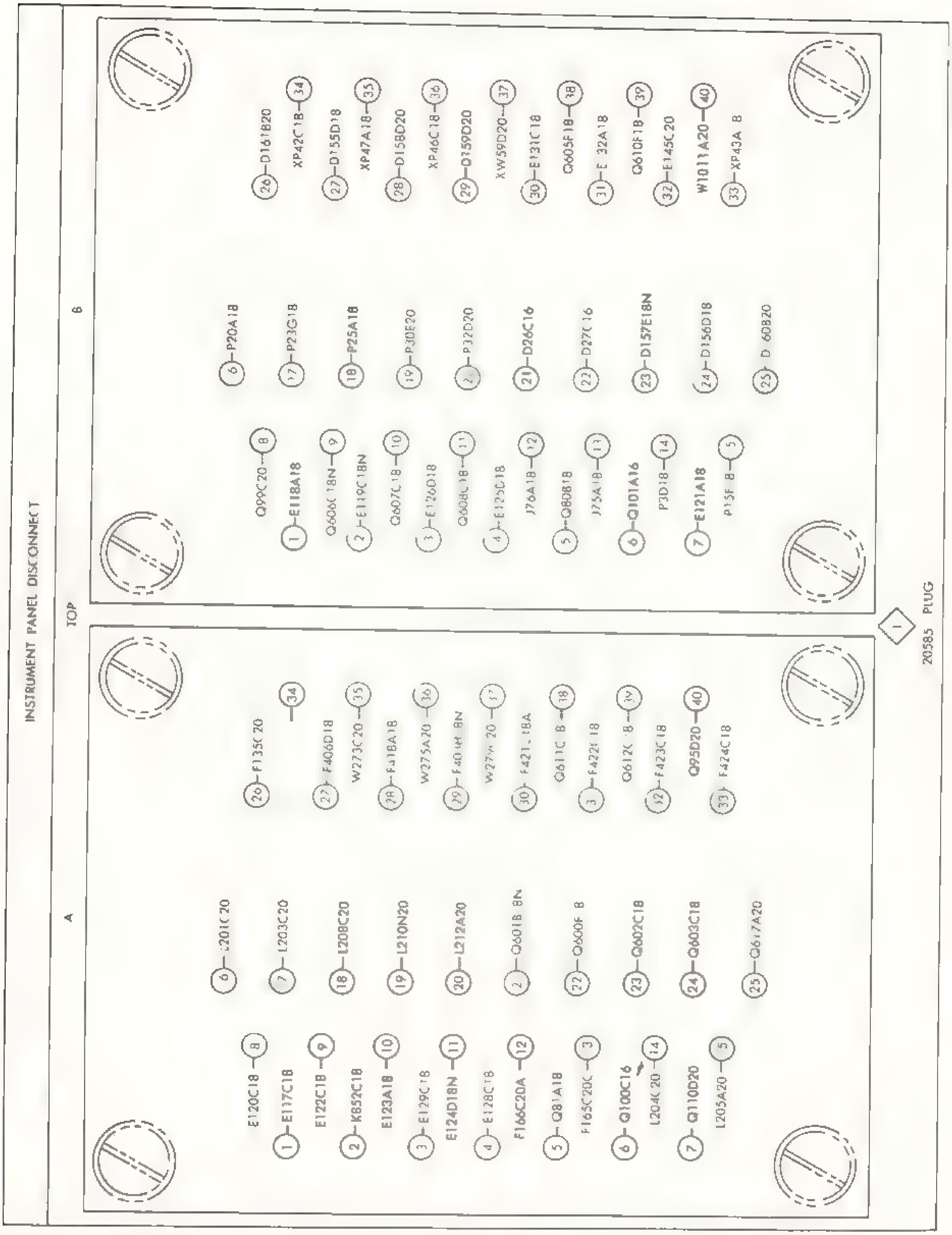


Figure 12–199. Disconnect plug and receptacle chart — electrical (model CH 34C serial No. prior to 57-1742) (Sheet 1 of 8)

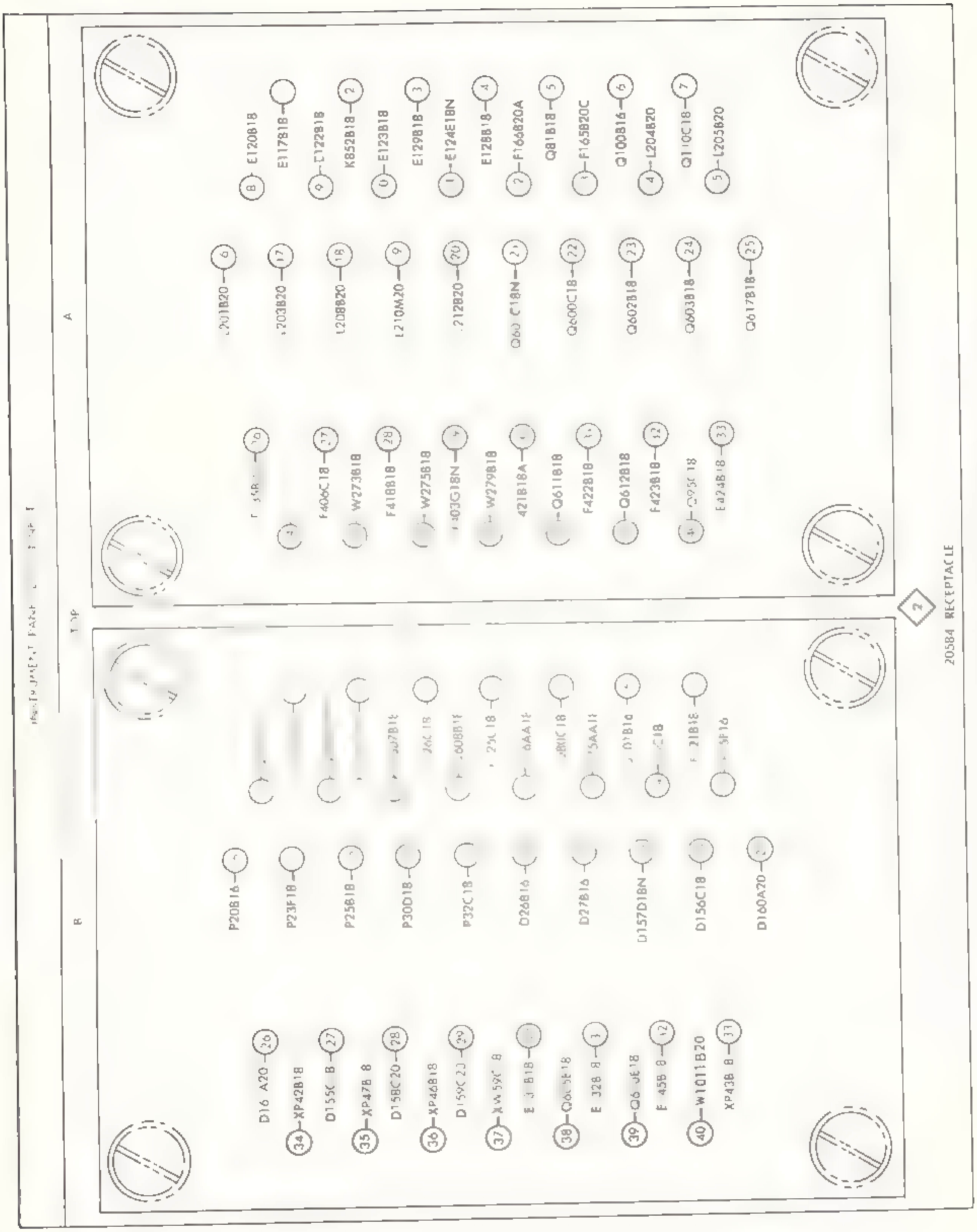
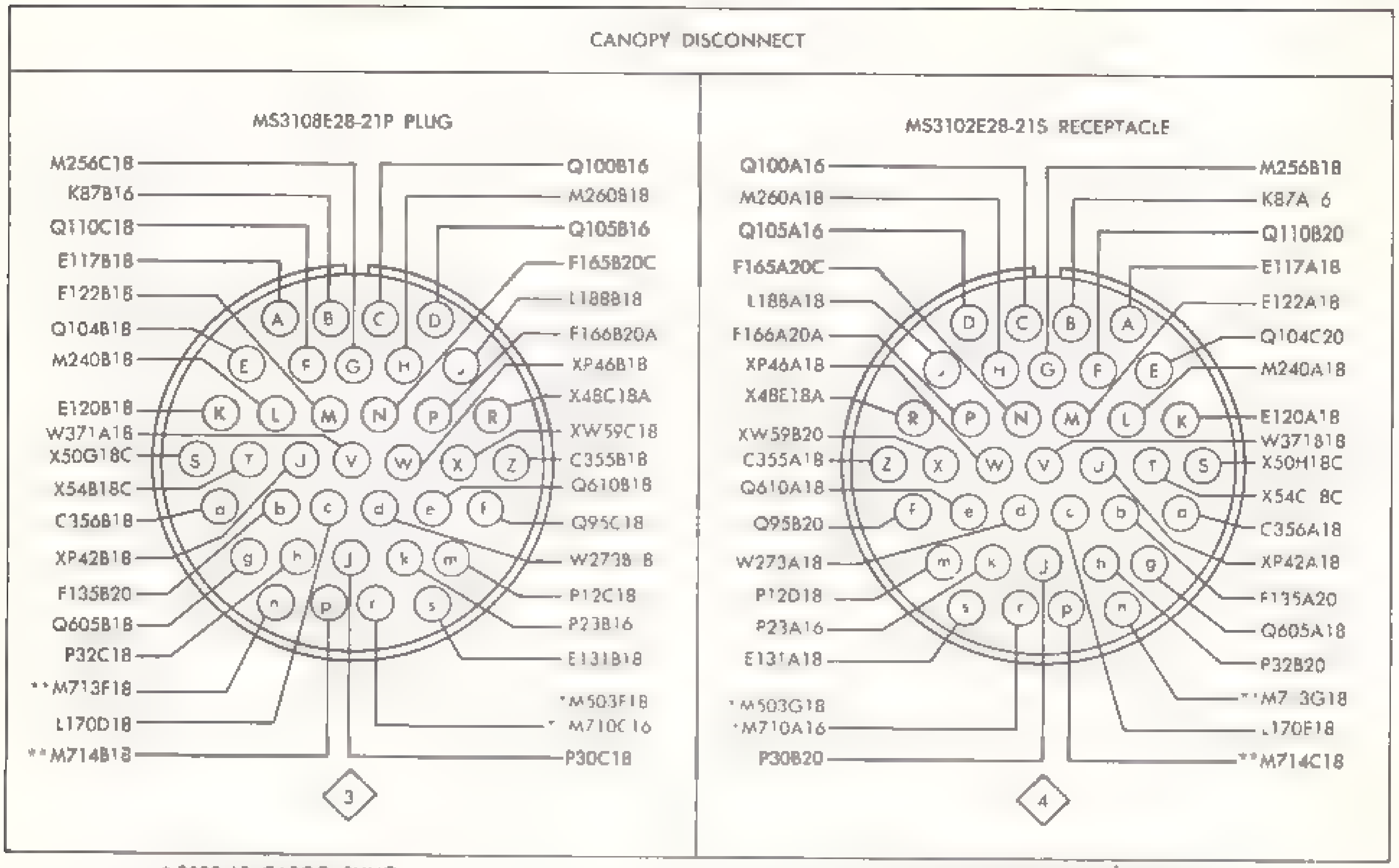


Figure 12–199. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. prior to 57-1742) (Sheet 2 of 8)



* 2000 LB CARGO SLING
** 5000 LB CARGO SLING

*** HELICOPTERS SERIAL No. 53-4475
THROUGH 56-4312

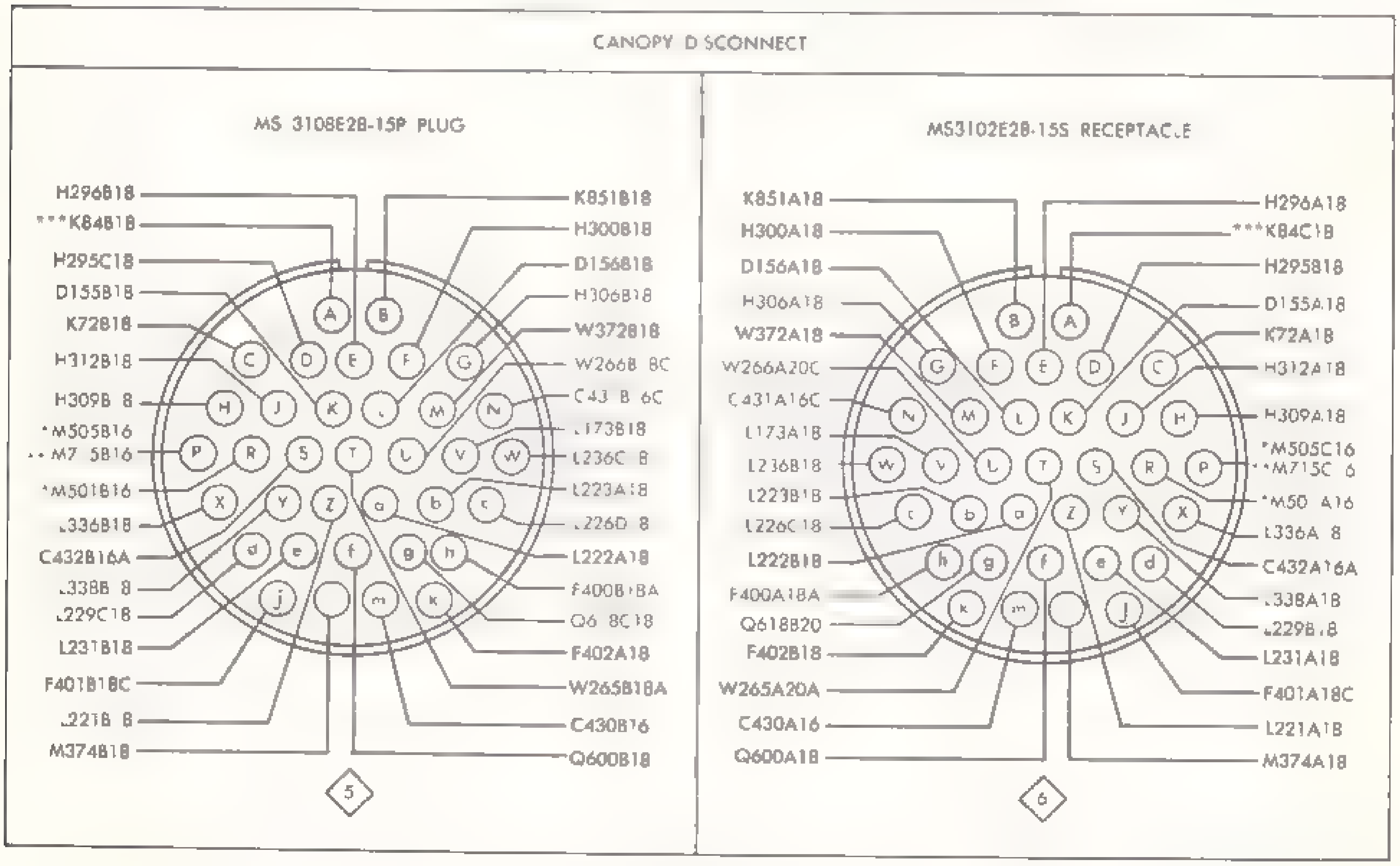
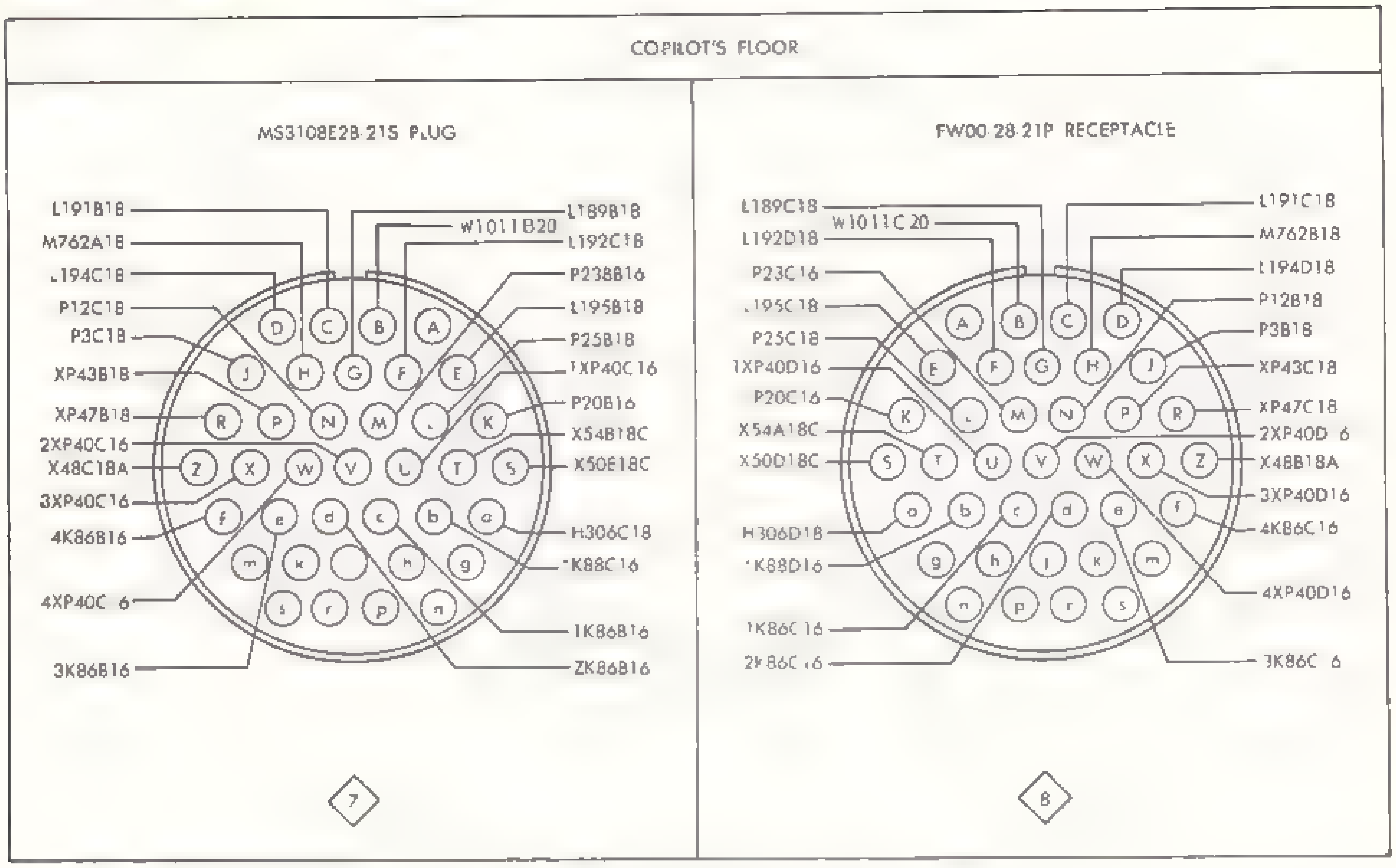


Figure 12–199. Disconnect plug and receptacle chart – electrical (model CH-34C serial No. prior to 57-1742) (Sheet 3 of 8)



* HELICOPTERS SERIAL No. 53-4475 THROUGH 56-4312

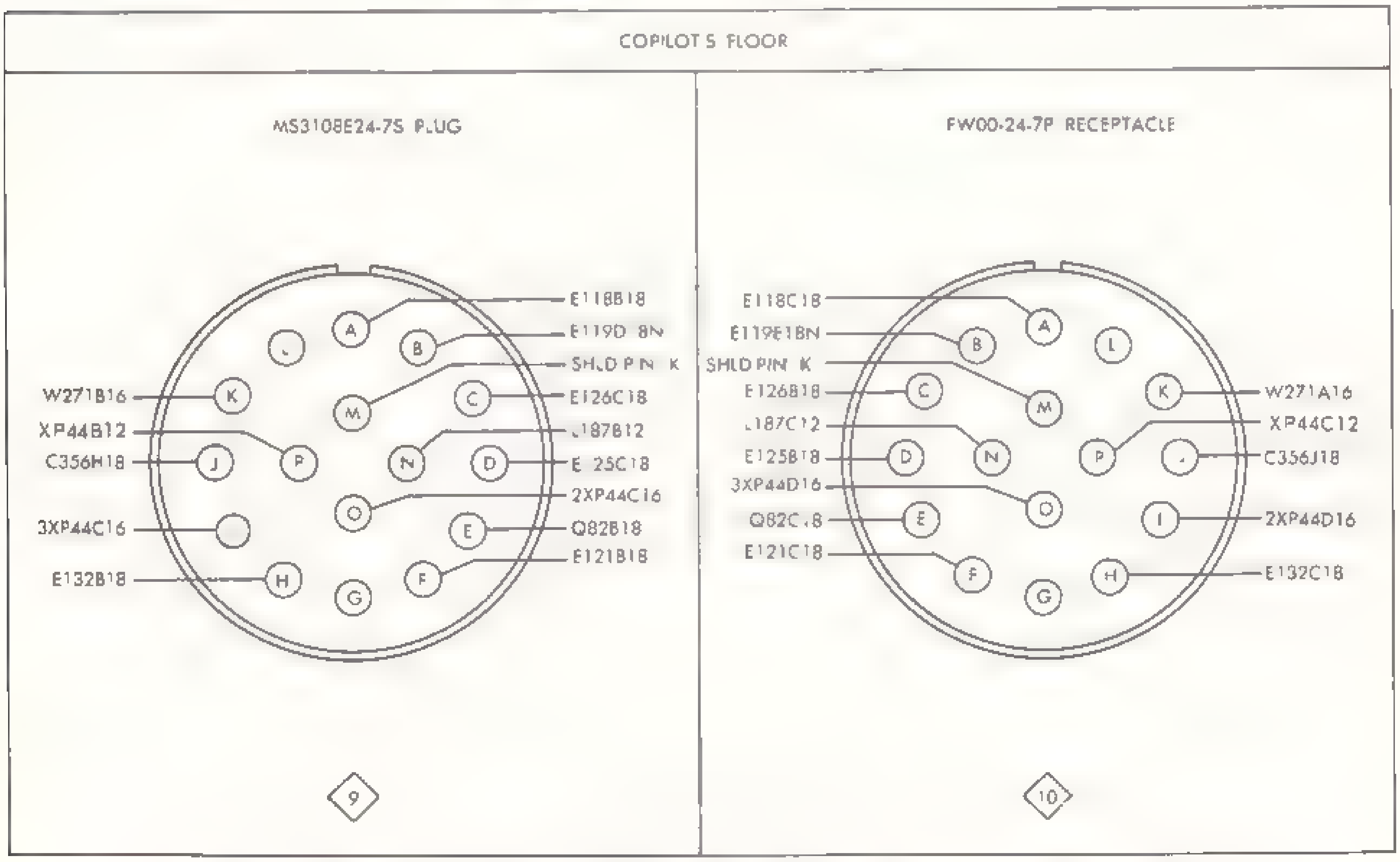
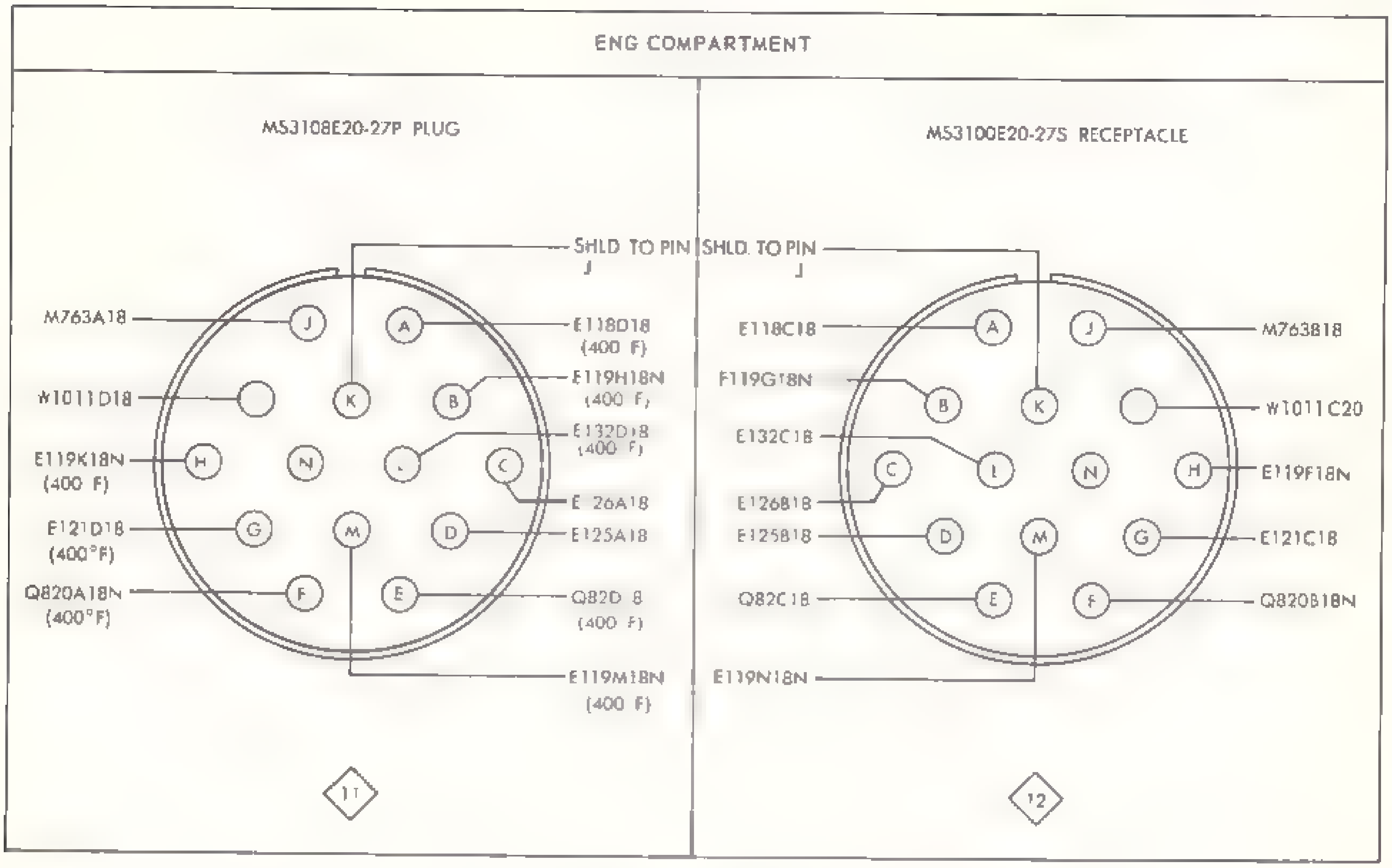


Figure 12–199. Disconnect plug and receptacle chart – electrical (model CH-34C serial No. prior to 57-1742) (Sheet 4 of 8)



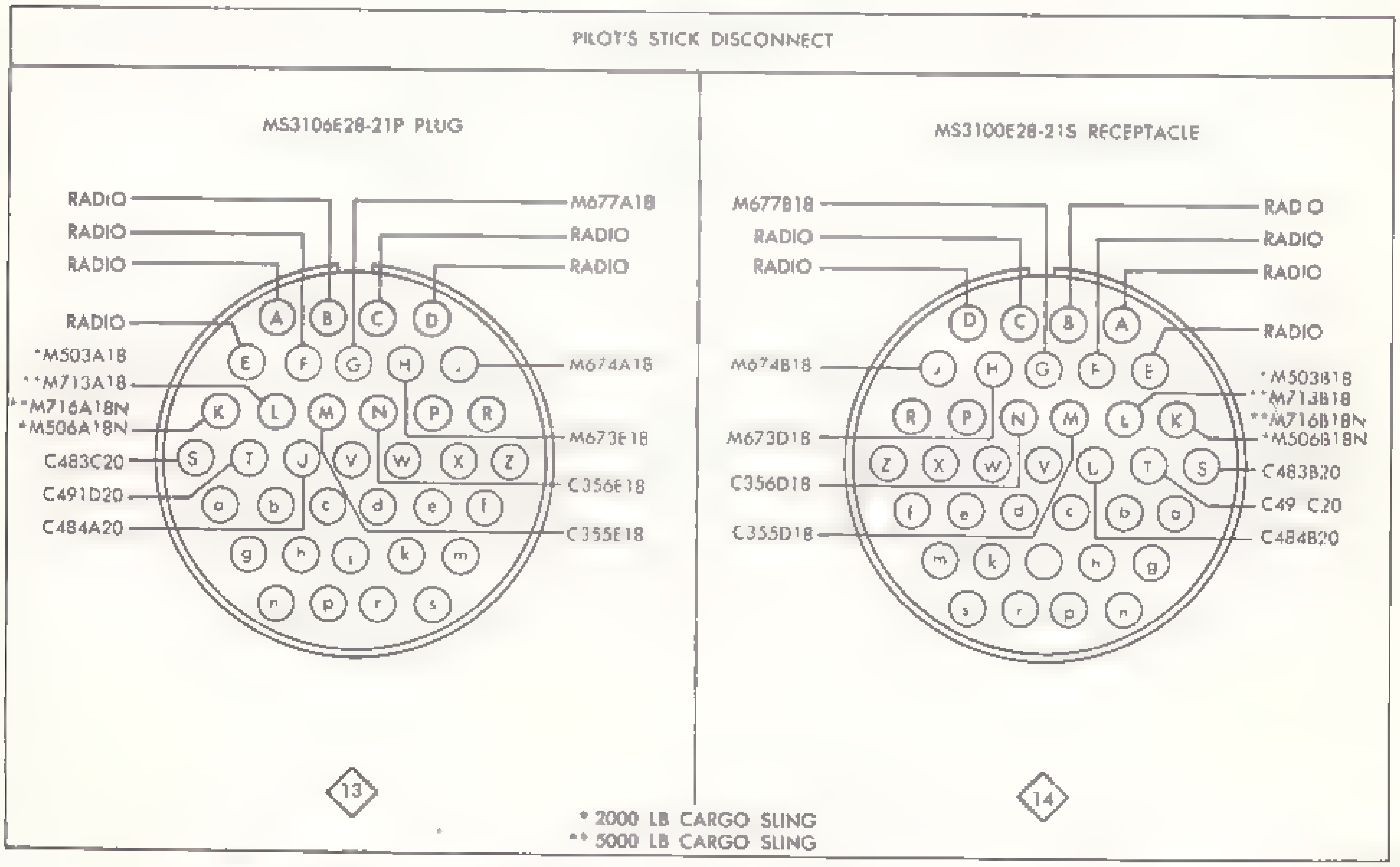


Figure 12—199. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. prior to 57-1742) (Sheet 5 of 8)

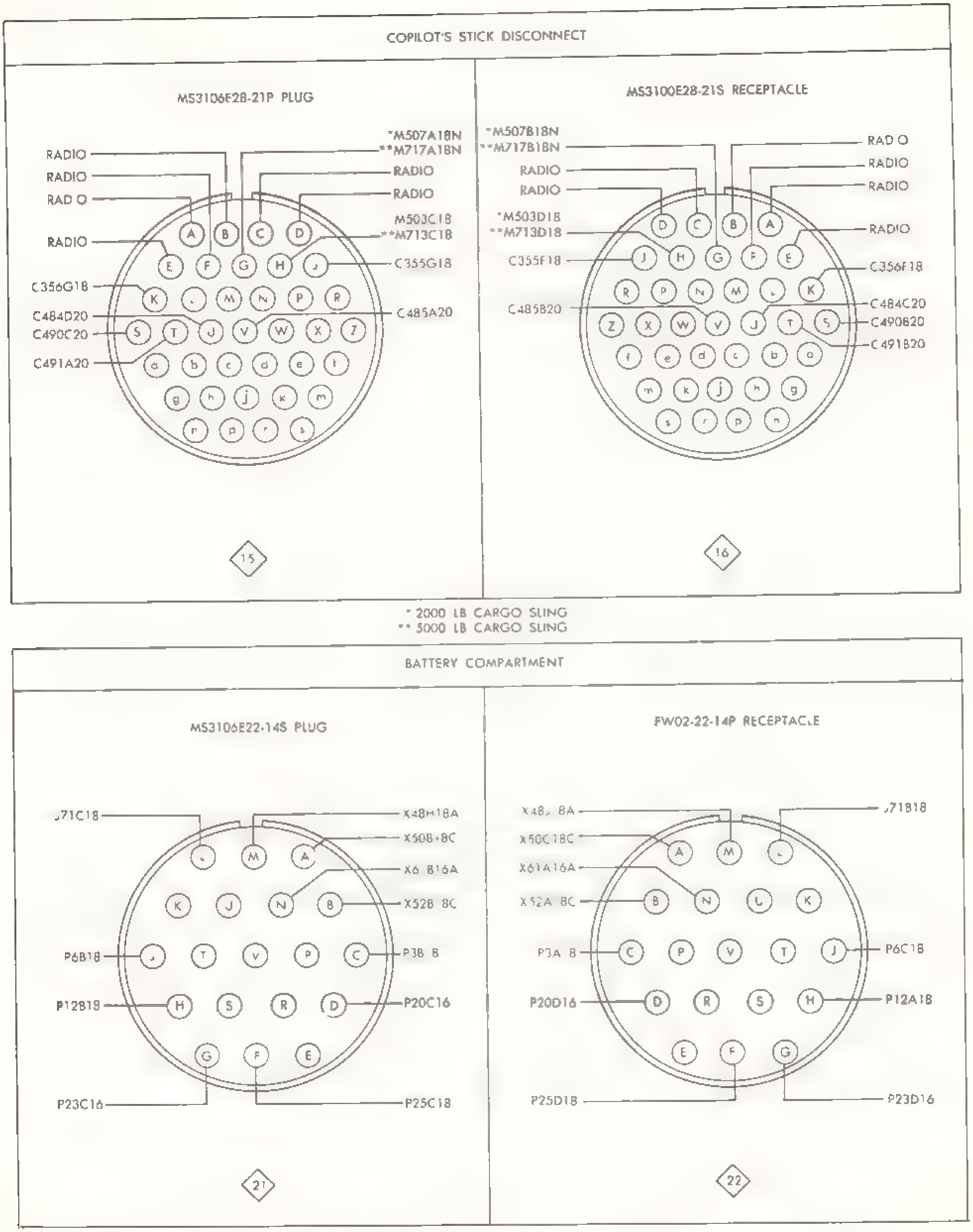


Figure 12—199. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. prior to 57-1742) (Sheet 6 of 8)

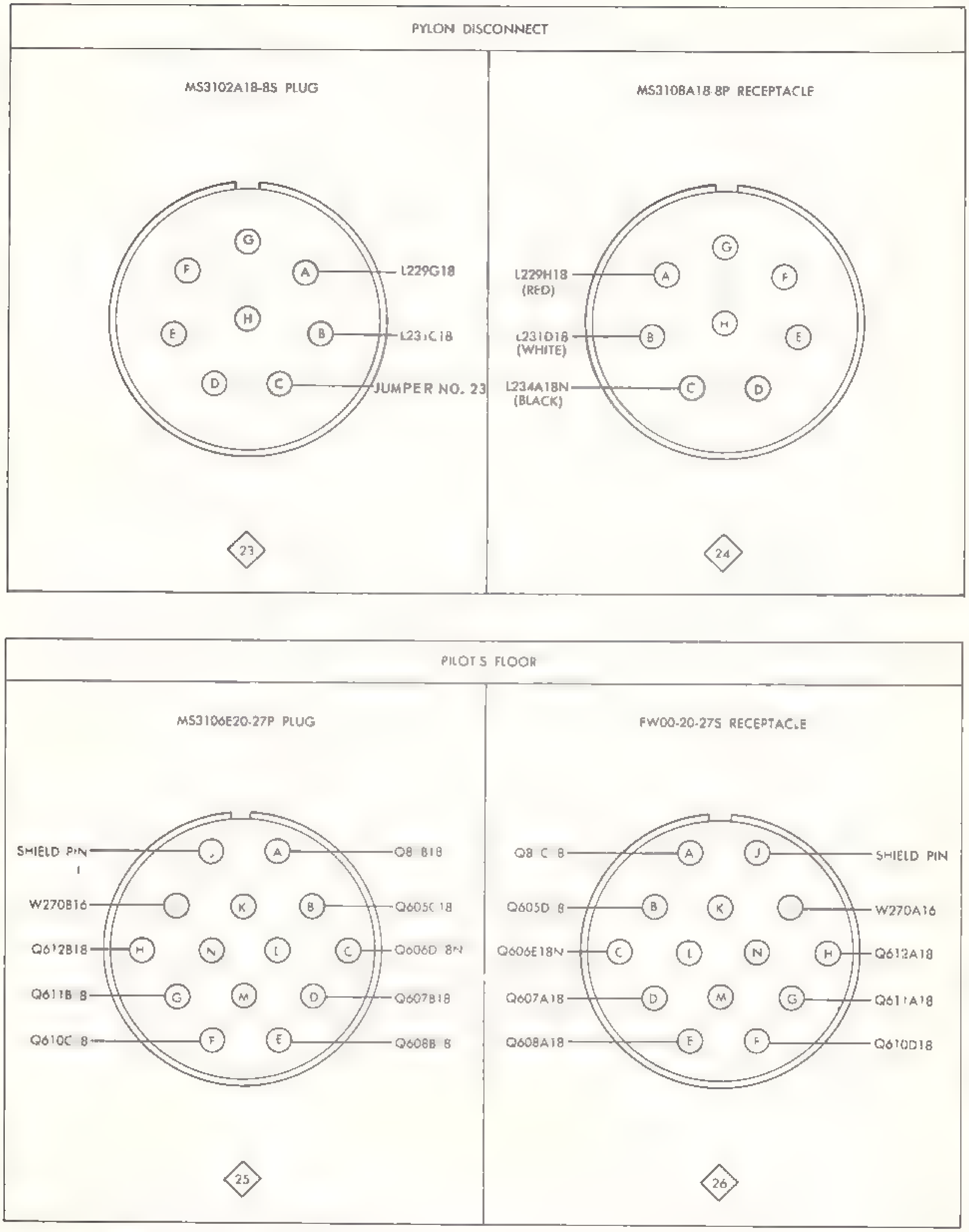


Figure 12—199. Disconnect plug and receptacle chart — electrical (model CH-34C serial No. prior to 57-1742) (Sheet 7 of 8)

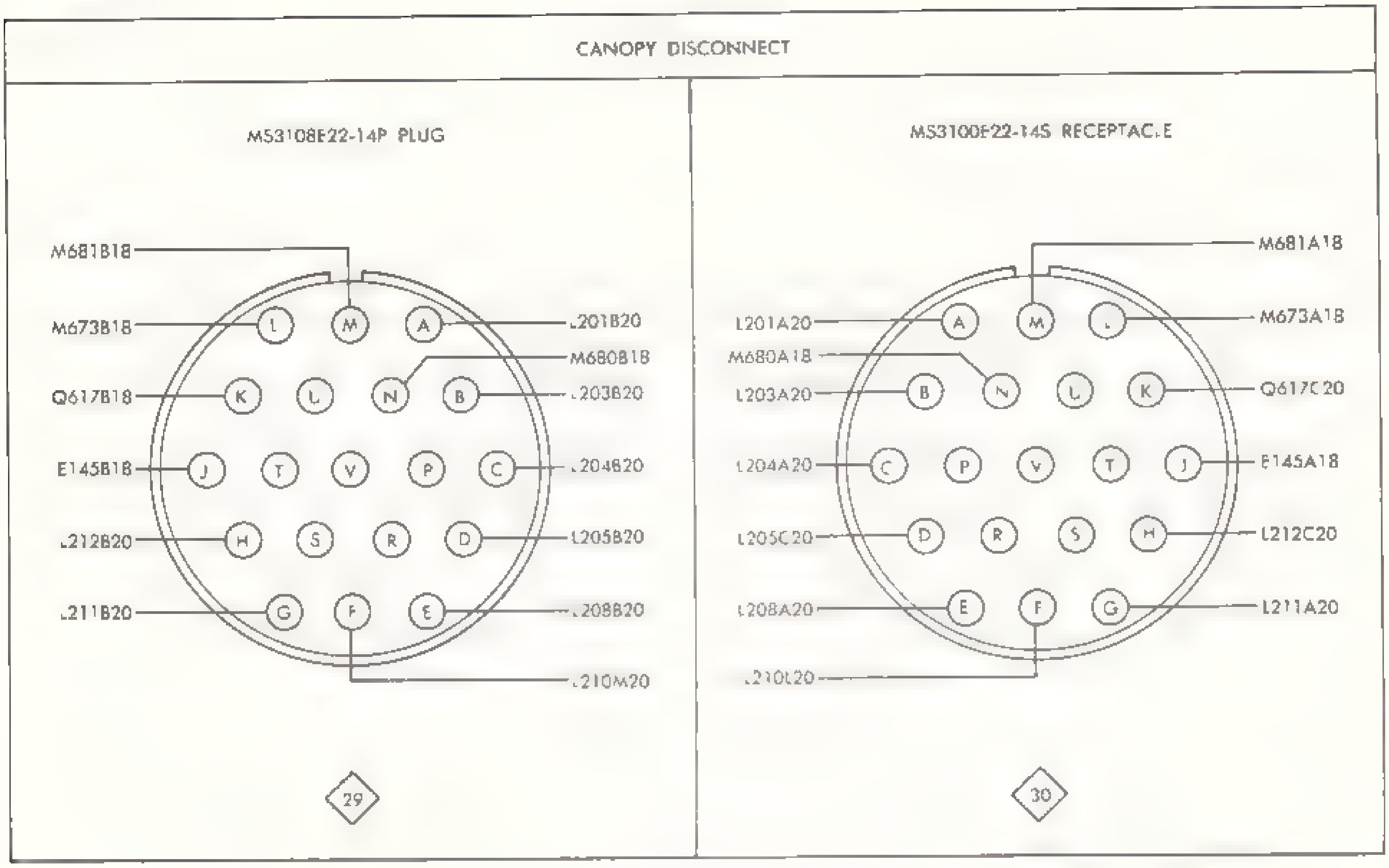


Figure 12–199. Disconnect plug and receptacle chart – electrical (model CH-34C serial No. prior to 57-1742) (Sheet 8 of 8)

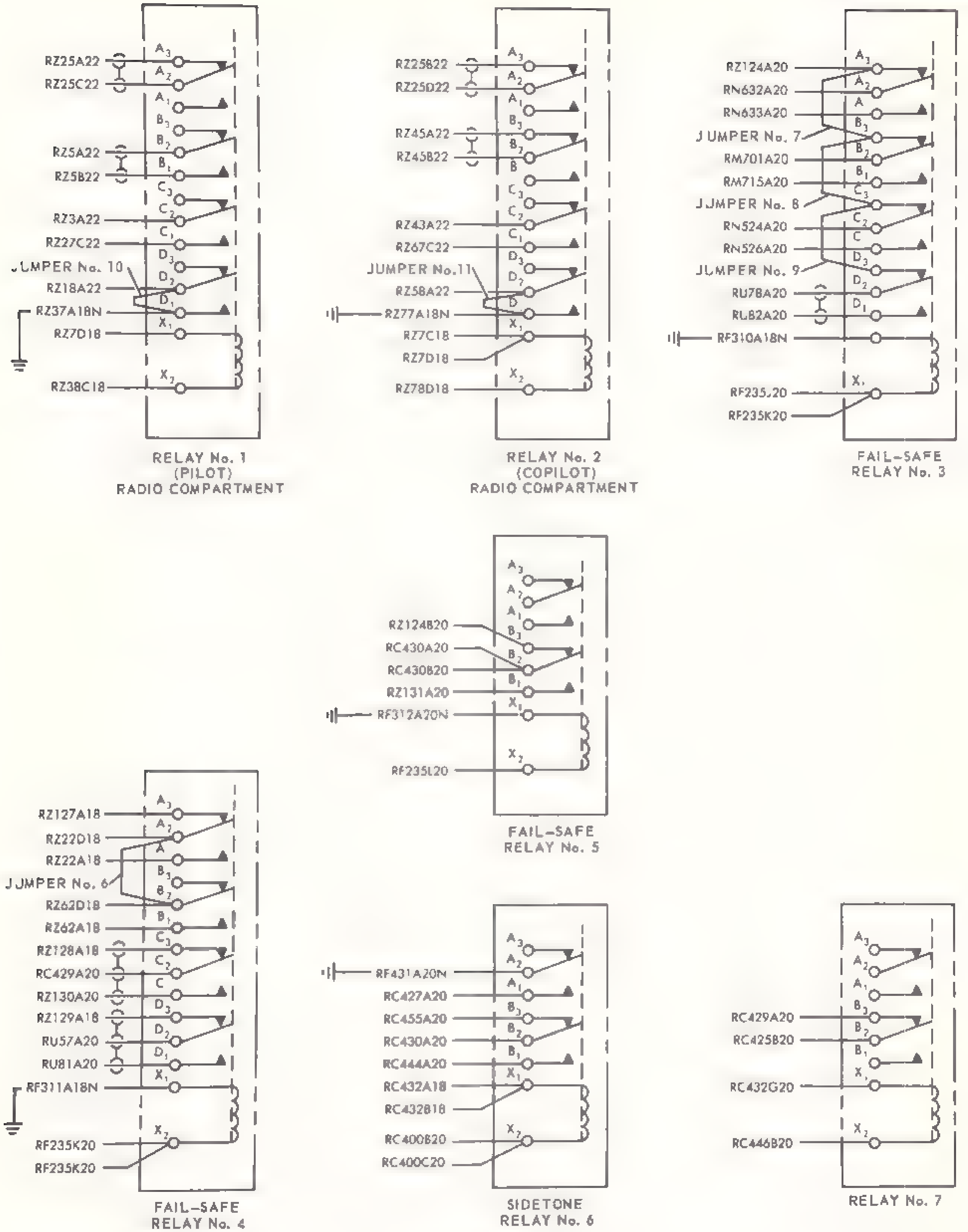


Figure 12—200. Relay chart — radio (model CH-34A serial No. 57-1691 through 57-1725)

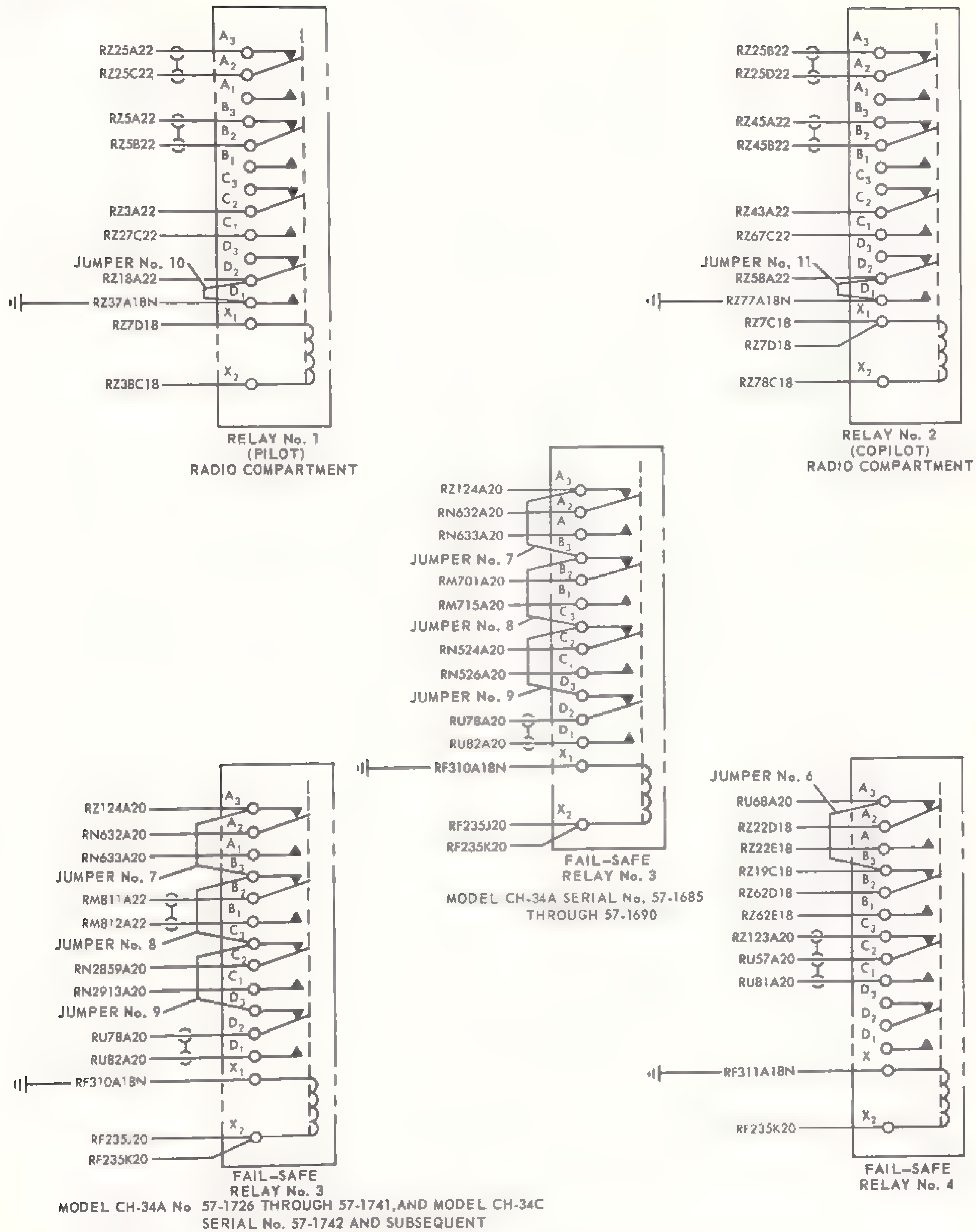
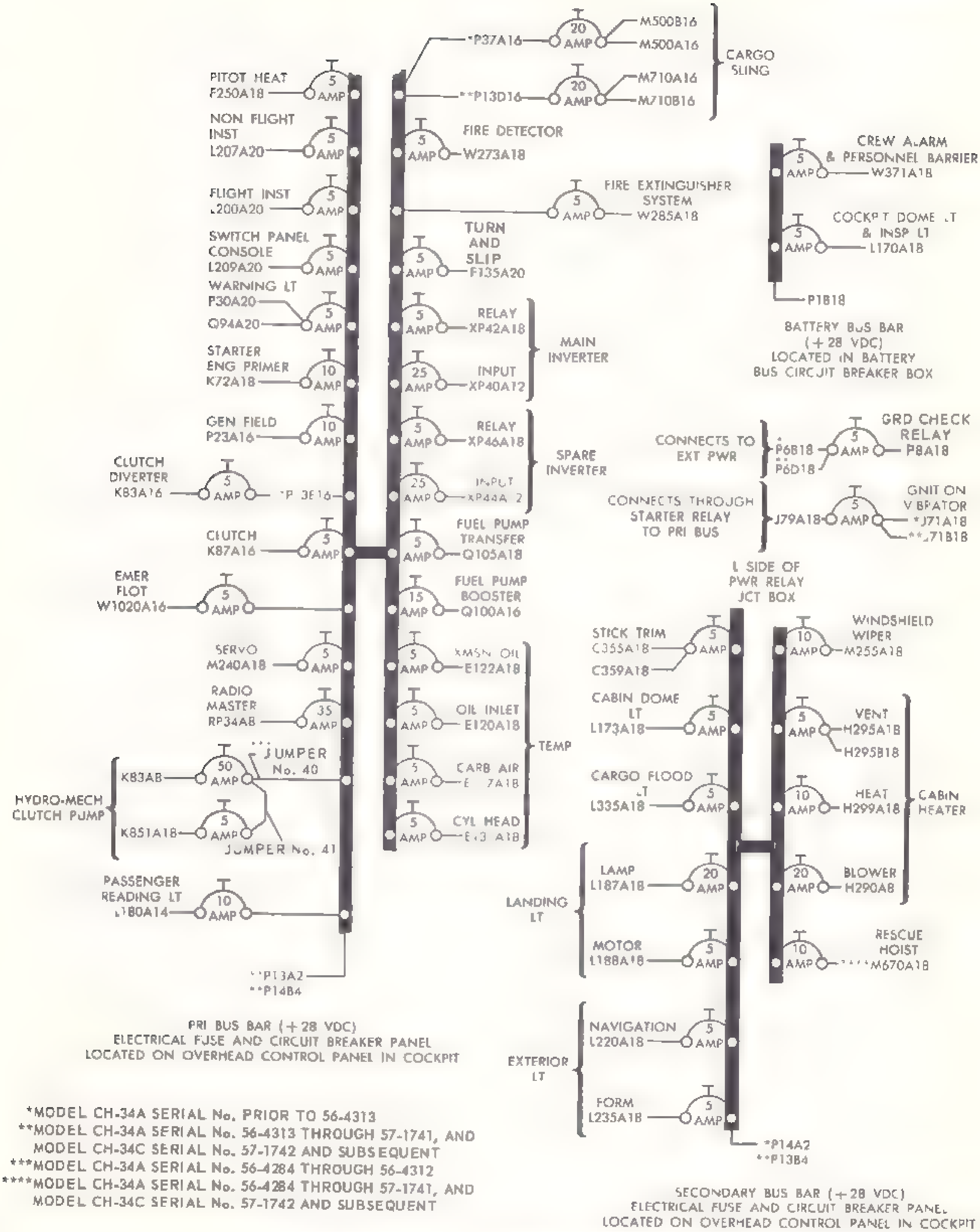


Figure 12—201. Relay chart — radio {model CH-34A serial No. 57-1685 through 57-1690, 57-1726 through 57-1741, and model CH-34C serial No. 57-1742 and subsequent}



*MODEL CH-34A SERIAL No. PRIOR TO 56-4313
**MODEL CH-34A SERIAL No. 56-4313 THROUGH 57-1741, AND MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT
***MODEL CH-34A SERIAL No. 56-4284 THROUGH 56-4312
****MODEL CH-34A SERIAL No. 56-4284 THROUGH 57-1741, AND MODEL CH-34C SERIAL No. 57-1742 AND SUBSEQUENT

Figure 12—202. Circuit breaker diagram — electrical

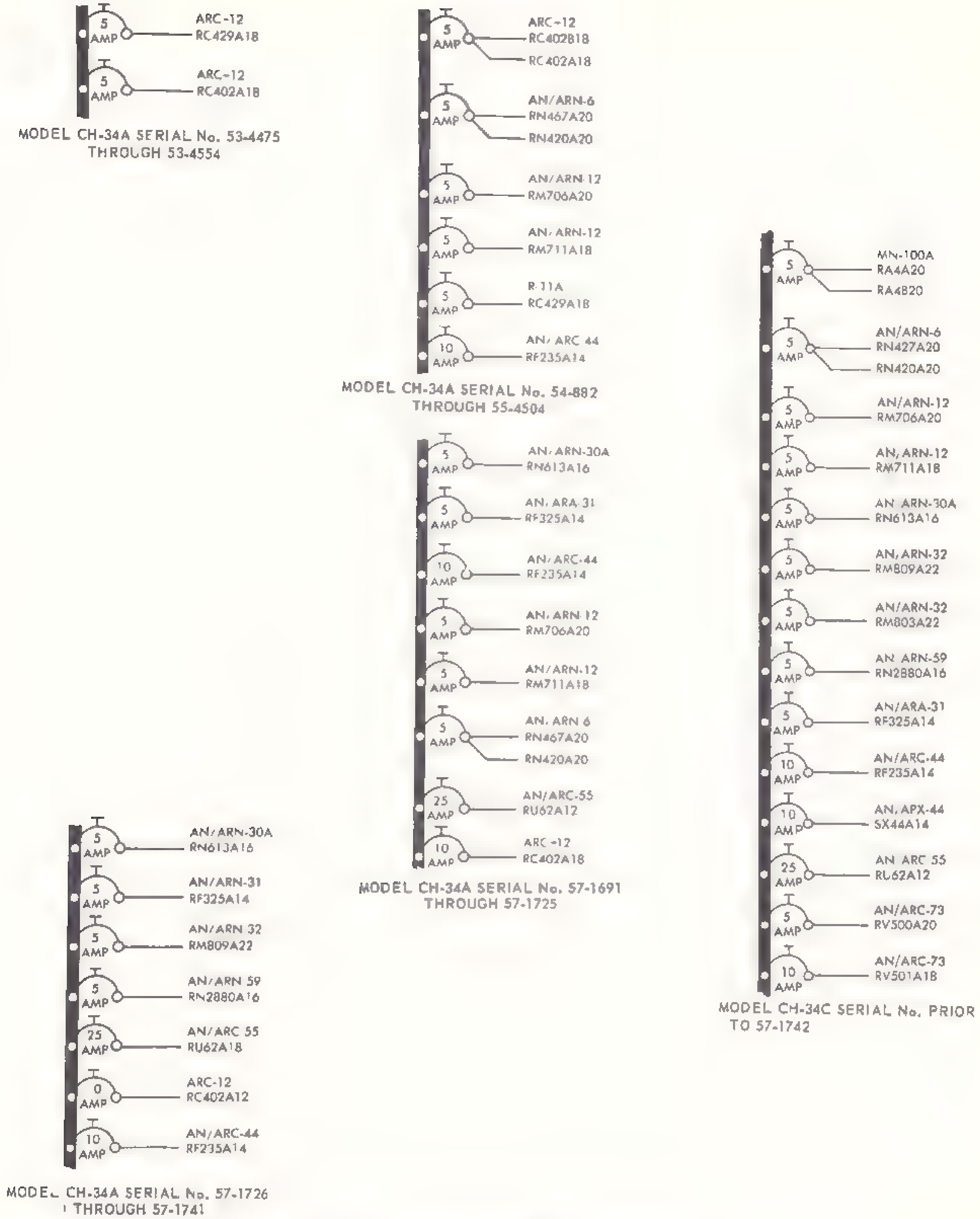
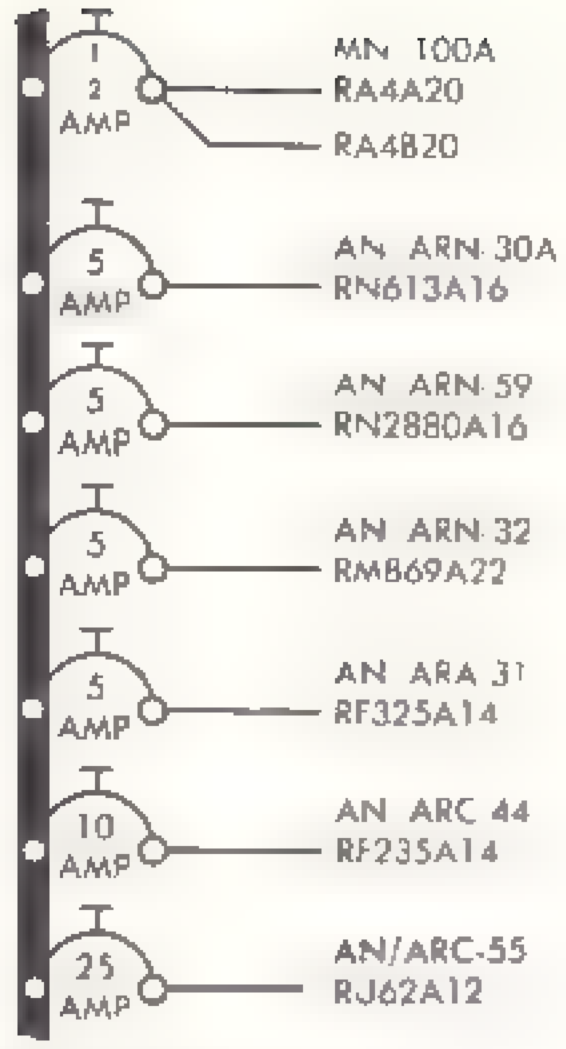
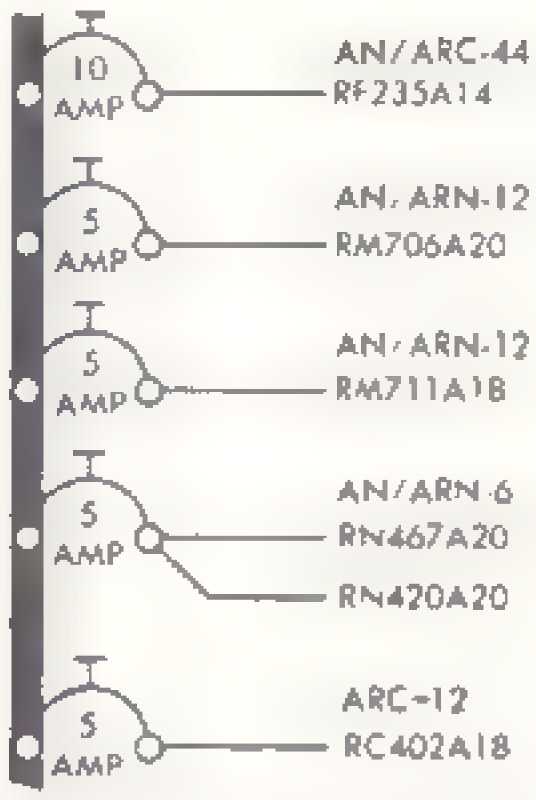


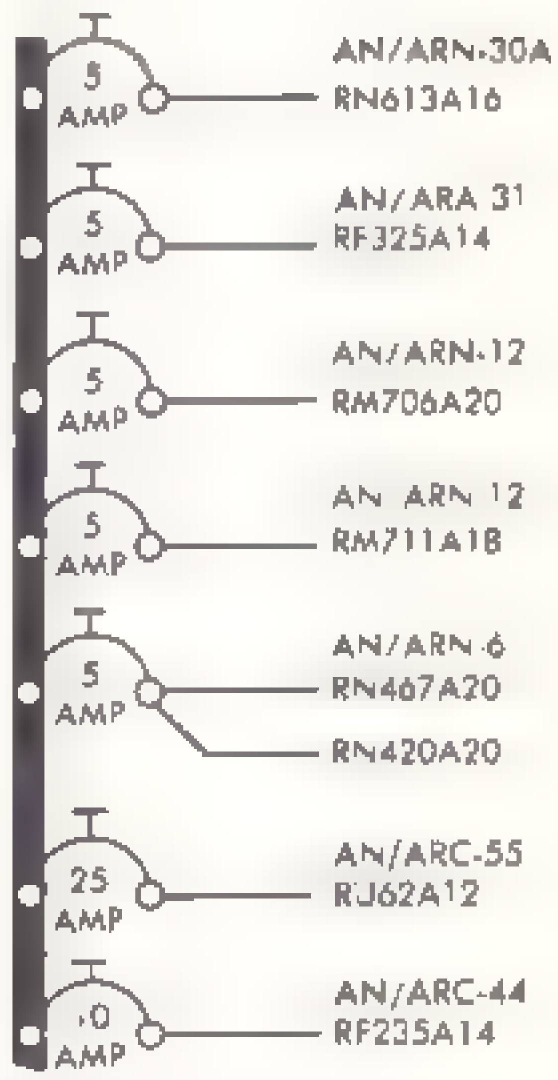
Figure 12–203. Circuit breaker diagram — radio (Sheet 1 of 2)



MODEL CH-34C SERIAL No. 57-1742
AND SUBSEQUENT



MODEL CH-34A SERIAL No. 56-4284 THROUGH
56-4314, 56-4317 THROUGH 56-4319, AND
56-4321 THROUGH 56-4342



MODEL CH-34A SERIAL No. 57-1685
THROUGH 57-1690

Figure 12–203. Circuit breaker diagram – radio (Sheet 2 of 2)

CHAPTER 13

AVIONICS AND PHOTOGRAPHIC

Not Applicable

CHAPTER 14
ARMAMENT

Not Applicable

CHAPTER 15

EXTERNAL STORES – NONARMAMENT

Not Applicable

CHAPTER 16

STORAGE OF AIRCRAFT

Section I Scope

16–1. Introduction. The storage instructions defined herein apply to limited periods of storage (up to 180 days) depending on the helicopter status as operational reserve or for reasons of minor repair, modification, reassignment, or disposition actions. Preparation for storage, whether for flyable storage (0 to 14 days), temporary storage (14 to 45 days), or limited storage (45 to 180 days), must be in complete accordance with the applicable instructions contained in Section II and TM 55-405-1.

16–2. Flyable Storage. Flyable storage applies when helicopter is to be stored for a period of 14 days or less and is to be maintained in a flyable condition.

16–3. Temporary Storage. Temporary storage applies to a helicopter undergoing minor repair, modification, awaiting reassignment or disposition, being held as operational reserve, or other circumstances which would result in the helicopter being grounded up to and including 45 days.

16–4. Limited Storage. Limited storage applies to a helicopter undergoing major repair, modification, awaiting reassignment, withdrawal from service, or other circumstances which would result in the helicopter being grounded for more than 45 days, but less than 180 days.

16–5. Responsibility. *a.* The local maintenance officer shall be responsible for processing a helicopter into storage in accordance with existing directives, using the minimum requirements and taking into consideration the length of time it will be in storage and local climatic conditions. These requirements shall be sufficient to ensure that airframe, systems, components, and assemblies are processed into a satisfactory state of preservation.

b. Where it is necessary to place a helicopter in storage, every reasonable effort shall be made by the responsible activity to ensure that the stored helicopter can be removed from storage with a minimum of manhours and requirement for parts.

c. When a helicopter, having a storage history within the past 6 months, requires processing by a maintenance activity, it shall be the maintenance activities responsibility to accomplish uncompleted removal-from-storage requirements.

d. Storage of helicopter awaiting IROAN, modification, repair, and/or return to the activity to which assigned shall be arranged and accomplished by each activity to meet its local requirements.

16–6. Aircraft Form Entries. *a.* Upon completion of storage instructions, the following note must be entered, as applicable, on DA Form 2408-16, and in Remarks column of DA Form 2408-13: TM 55-1520-202-20, Chapter 16, paragraphs complied with (date), (station), and (inspector's name).

b. Only those technical manuals which directly affect safety of flight will be entered on DA Form 2408-16 during storage periods.

c. Upon return of helicopter to active status, up-to-date maintenance and historical records must be prepared and processed in accordance with applicable directives.

d. Before the helicopter is transferred to a storage activity, it must be inventoried at the time it is placed in storage and reinventoried at the time of processing from storage in accordance with AR 750-5.

e. Action will be taken by storage activities to replace shortages in accordance with AR 750-5.

Section II Procedures

16–7. Procedures. This section contains information on the procedures used in parking and mooring; inspection; preparation for flyable, temporary or limited storage; and activation after flyable, temporary, or limited storage.

16–8. Mooring and Parking. Refer to paragraphs 1–50 and 1–51 for mooring and parking instructions.

16–9. Inspection Procedures. Prior to placing a helicopter in flyable storage, perform inspection in accordance with TM 55-1520-202-20 PMD. A helicopter placed in temporary or limited storage will be inspected in accordance with TM 55-1520-202-20 PMI. Organizational maintenance officers shall be responsible for establishing an inspection program to ensure that the following inspection procedures outlined in paragraphs 16–10 through 16–12 are performed periodically.

16–10. Inspection During Flyable Storage. Inspection during storage for a helicopter inactive up to 14 days necessitates periodic checks as follows:

a. Remove protective covers.

b. Perform inspection in accordance with TM 55-1510-202-20 PMD.

c. Check mooring ropes for security and sufficient slack; and mooring points for damage.

d. Rotate nylon tires every 3-days to prevent tires from taking a set.

e. Inspect helicopter at intervals during, and immediately after being subjected to high-velocity winds exceeding 35 knots. Repair or replace damaged equipment as necessary.

f. Install protective covers. (Refer to paragraph 1–58.)

16–11. Inspection During Temporary Storage. Inspection for a helicopter in storage for a period of 15 to 45 days necessitates periodic checks as follows:

a. Remove all protective covers.

b. Perform inspection in accordance with TM 55-1510-202-20 PMI.

c. Check mooring ropes for security and sufficient slack; and mooring points for damage.

d. Carefully inspect at regular intervals of 15 days and treat for corrosion, if necessary, all helicopters placed in storage where local average humidity exceeds 40 percent. Where local average humidity is 40 percent or less, inspect and treat helicopter for corrosion every 30 days. In conducting an inspection for corrosion, pay particular attention to those areas where moisture deposits will not evaporate rapidly. Normally, corrosion will not be as prevalent on painted surfaces as on unpainted surfaces; however, under some conditions, corrosion may attack the metal through the paint. In such cases, paint on the affected areas will be blistered or scaly in appearance.

e. If interior temperature of helicopter exceeds 160°F (71°C), ventilate helicopter by opening all doors and windows; if necessary, promote air circulation by use of fans or other forced-air equipment.

f. Inspect engine cylinder dehydrator plugs weekly and replace as soon as their color indicates unsafe conditions.

Note

If dehydrator plugs have changed color in one-half or more of cylinders, also replace dehydrating agent in air intake scoop.

g. Rotate wheels on helicopter after 30 days if helicopter is not blocked up or on skids. Maintain a minimum air pressure of 75 percent normal in all tires. (Refer to paragraph 1–60.)

16–12. Inspection During Limited Storage. Inspection for a helicopter in storage for a period of 45 to 180 days necessitates periodic checks as follows:

a. Remove protective covers.

b. Perform inspection in accordance with TM 55-1510-202-20 PMI.

c. Check mooring ropes for security and sufficient slack; and mooring points for damage.

d. Accomplish inspection procedures outlined in paragraph 16–11, steps *d* and *e*.

e. Rotate wheels on helicopters not on skids or blocks every 30 days; if nylon tires are installed, rotate every 3 days to prevent tires from taking a set. Maintain air pressure of 75 percent normal (paragraph 1–60) in all tires if helicopter rests on the wheels, and 15 psi minimum pressure if supported on blocks.

f. Check hydraulic system periodically for leaks. Repair if necessary.

g. Inspect communication sets for deterioration periodically. If more than mild deterioration is evident, remove major components, package, and turn in to local supply.

h. Inspect lower part of fuselage for trapped water. If water is found, remove one rivet from between any two fuselage formers for drainage and future drainage. Mark location of rivets removed by a circle 2 inches in diameter and approximately 1/4-inch wide, with insignia red enamel (item 25, table 1–8). Make an entry on DA Form 2408-13 indicating location of removed rivets. Paint all exposed portions of metal from

which rivets have been removed with primer coating (item 19, table 1–8).

16–13. Preparation for Flyable Storage. A helicopter being placed inactive for a period up to 14 days must be prepared for storage in accordance with instructions in paragraphs 16–14 through 16–17. Contingent upon their status, helicopters under repair, modification, etc, must also receive storage treatment compatible with the condition of the helicopter.

16–14. Engine. Engines installed in helicopters which will not be flown for 14 days or less, or are undergoing maintenance of 14 days duration or less, will be treated as follows:

a. For a period of up to 7 days, perform engine ground run, or turn engine by its starter, every 3 days. The ground run consists of engine operation at a speed greater than idle for a period of 5 minutes or until the highest allowable oil temperature is attained, whichever occurs first.

b. After 7 days, perform cylinder preservation on engine in accordance with TM 55-405-5.

c. For an engine that is undergoing repair or inspection, or an engine installed in a helicopter undergoing repair for 14 days or less which is not possible to start, turn by starter for at least 8 revolutions every 3 days. Follow this procedure with a ground run on seventh day of idleness, unless engine is still inoperative, in which case preserve it in accordance with TM 55-405-5.

Note

As an alternate procedure, inactive engines may be preserved for the entire period of 14 days. Refer to TM 55-405-5.

16–15. Alighting Gear. a. Inflate tires to normal air pressure. (Refer to paragraph 1–60.)

b. Properly inflate landing gear shock struts. (Refer to paragraph 1–60.)

16–16. Fuel System. a. Fill all fuel tanks in accordance with paragraph 1–60.

b. If fuel tanks cannot be filled, and it is expected that helicopter will be inactive for 10 days or longer, drain fuel system in accordance with paragraph 1–60, then preserve interior surface of fuel tank. (Refer to TM 55-405-3.)

16–17. Airframe. a. Clean entire airframe in accordance with paragraphs 1–62 through 1–67.

b. Check all drain holes on helicopter for obstructions and clean where necessary.

c. Clean relief tube in accordance with paragraph 1–68.

d. Open ventilators in flight compartment and crew seating area.

e. Leave all cabin seats in unfolded position.

f. Park helicopter in accordance with paragraph 1–51.

g. Install static ground.

h. Remove from vicinity any objects likely to strike helicopter during high wind condition.

16–18. Preparation for Temporary Storage. A helicopter being placed inactive for a period between 15 and 45 days must be prepared for storage in accordance with paragraphs 16–19 through 16–29. Contingent upon their status, helicopters under repair, modification, etc, must also receive storage treatment compatible with the condition of the helicopter.

16–19. Engine. Preserve engine in accordance with TM 55-405-5.

16–20. Main Transmission (Main Gear Box) and Intermediate and Tail Gear Boxes. a. Fill main transmission (main gear box) and intermediate and tail gear boxes with lubricating oil (item 8, table 1–8).

b. During ground run-up, when preparing engine for storage in accordance with TM 55-405-5, perform normal clutch engagement to operate transmission system, thereby accomplishing necessary internal sloshing for preservation of main, intermediate, and tail gear boxes.

c. Clean all unprotected surfaces, shafts, etc with solvent (item 4, table 1–8) and dry using a clean, lint-free cloth.

16–21. Main Rotor Assembly. a. Lubricate main rotor assembly in accordance with figure 2–1. Purge all bearings.

b. Service dampers and reservoirs with hydraulic fluid (items 3 and 9, table 1–8). Refer to paragraph 1–60.

c. Completely cover main rotor head assembly with a protective cover. If standard protective cover is not available, oil cloth or other suitable material may be used and secured with tape (item 26, table 1–8) and/or string. Install main rotor blade covers. (Refer to paragraph 1–58.)

Note

To ensure adequate protection for main rotor bearings, lubricate in accordance with instructions in lubrication chart (figure 2–1) every 45 days of storage period.

16–22. Tail Rotor Assembly. a. Lubricate tail rotor assembly in accordance with lubrication chart (figure 2–1). Purge all bearings.

Note

To ensure adequate protection for tail rotor bearings, lubricate in accordance with instructions in lubrication chart (figure 2–1) every 45 days of storage period.

b. Completely cover tail rotor hub with standard tail rotor cover. Install tail rotor blade covers.

16–23. Electrical. a. Disconnect and remove storage battery from helicopter. Maintain battery in accordance with TM 55-405-3.

b. Wrap battery cable terminals with barrier material (item 7, table 1–8).

c. Remove battery sump jar, clean with solution of sodium bicarbonate (item 18, table 1–8) and reinstall.

d. Clean battery compartment.

e. Cover all loose electrical plugs with suitable waterproofed material.

f. Unless otherwise directed, all electrical equipment will remain in helicopter. Wrap all electrical equipment with barrier material (item 7, table 1–8) and properly secure with tape (item 26, table 1–8).

g. Plug battery vent system.

16–24. Alighting Gear. a. Properly inflate alighting gear shock struts.

Note

Refer to servicing instructions on nameplate attached to each shock strut (if helicopter is not blocked).

b. Inflate tires to normal air pressure. (Refer to paragraph 1–60.)

16–25. Fuel System. Service the fuel system in accordance with paragraph 1–60.

16–26. Airframe. Prepare the airframe for storage in accordance with paragraph 16–17.

16–27. Hydraulic System. Service the hydraulic systems to normal operating capacity in accordance with table 1–5.

16–28. Fire Extinguishers. The fire extinguishers must remain in their stored positions in the helicopter in a fully charged condition.

16–29. Instruments. a. Install pitot tube cover over pitot head.

b. Cover pitot tube static port with barrier material (item 7, table 1–8) and properly secure with tape (item 26, table 1–8).

Note

Instruments must remain in the helicopter while in storage.

16–30. Preparation for Limited Storage. A helicopter being placed inactive for a period between 46 and 180 days must be prepared for storage in accordance with paragraphs 16–31 through 16–43. Contingent upon their status, helicopters undergoing repair, modification, etc, must also receive storage treatment compatible with the condition of the helicopter.

16–31. Engine. Preserve engine in accordance with TM 55-405-5.

16–32. Main Transmission (Main Gear Box) and Intermediate and Tail Gear Boxes. a. Accomplish steps *a* through *c* of paragraph 16–20.

b. Seal all vents in main, intermediate, and tail gear boxes with tape (item 26, table 1–8).

c. Coat unprotected surfaces, shafts, etc with corrosion preventive compound (items 24 or 27, table 1–8) and cover with barrier material (item 7, table 1–8).

d. Attach warning tags with the following notation: GEAR BOX PRESERVED. DRAIN AND REFILL WITH PROPER LUBRICANT BEFORE OPERATING.

16–33. Main Rotor Assembly. a. Lubricate main rotor assembly in accordance with lubrication chart (figure 2–1). Purge all bearings.

b. Coat inside of taper pin holes at end of each sleeve and all unprotected surfaces of hub with corrosion preventive compound (item 24 or 27, table 1–8). (Accomplish where applicable when blades are installed and folded.) Cover each sleeve with barrier material (item 7, table 1–8), and secure with tape (item 26, table 1–8).

c. Service dampers and reservoirs with hydraulic fluid (items 3 and 9, table 1–8).

d. Completely cover main rotor head assembly with a protective cover. If standard protective cover is not available, oil cloth or other suitable material may be used and secured with tape (item 26, table 1–8) and/or string. Install main rotor blade covers. (Refer to paragraph 1–58.)

Note

To ensure adequate protection for main rotor bearings, lubricate in accordance with lubrication chart (figure 2–1) every 45 days of storage period.

16–34. Tail Rotor Assembly. a. Lubricate tail rotor assembly in accordance with lubrication chart (figure 2–1). Purge all bearings.

b. Coat all unprotected surfaces of hub with corrosion preventive compound (item 24 or 27, table 1–8).

c. Completely cover tail rotor hub with tail rotor cover. Install tail rotor blade covers.

Note

To ensure adequate protection for tail rotor bearings, lubricate in accordance with instructions in lubrication chart (figure 2–1) every 45 days of storage period.

16–35. Electrical. Prepare battery, battery compartment, and battery vent system in accordance with paragraph 16–23.

16–36. Alighting Gear. a. Prepare alighting gear (if helicopter is not blocked) in accordance with paragraph 16–24, steps *a* and *b* and as follows:

b. Rotate nylon tires every 3-day period to prevent tires from taking a set.

c. Rotate tires other than nylon at least once every 30-day period.

d. Cover tires to protect them from oil, fuel, and hydraulic fluid.

16–37. Fuel System. Service the fuel system in accordance with paragraph 16–16.

16–38. Airframe. Prepare the airframe for storage in accordance with paragraph 16–17.

16–39. Hydraulic System. a. Fully service all hydraulic reservoirs (including hydro-mechanical clutch reservoir) and charge accumulator to normal operating pressures in accordance with paragraph 1–60.

b. Clean all exposed finished surfaces of hydraulic system actuating rods, hydraulic cylinders, main and auxiliary servo pilot valves, and other hydraulic equipment with a lint-free cloth dampened with hydraulic fluid (item 3, table 1–8).

16–40. Fire Extinguishers. The fire extinguishers must remain in their stored positions in the helicopter in a fully charged condition.

16–41. Instruments. Accomplish the procedures outlined in paragraph 16–29 for limited storage.

16–42. Avionic Equipment. a. Leave all unclassified avionic equipment installed except headsets and microphones which should be removed, condition-tagged, and turned in to local supply.

b. Remove all classified avionic equipment and protect in accordance with latest applicable directives.

c. Wrap all communication equipment in barrier material (item 7, table 1–8) and properly secure with tape (item 26, table 1–8). If, during periodic inspection, more than mild deterioration is evident in communication sets, observe following procedures:

(1) Remove major components except radio transmitting and receiving antennas, repair, package in accordance with applicable directives, and store in helicopter from which removed.

(2) Coat exposed metal whip and mast antennas and mechanical items used with avionic equipment with corrosion preventive compound (item 24, table 1–8). Where necessary, remove mechanical items, which are rusted, from equipment; clean off rust; and either replace on equipment or treat, package, and store with antenna equipment.

16–43. Flyaway Items. Remove flyaway items subject to mildew and deterioration, condition-tag, and turn in to local supply. This includes AN/CRT-3 radio sets which contain a parachute.

16–44. Activation After Flyable Storage.

Helicopters returning to operation status after temporary storage must be depreserved in accordance with paragraph 16–45 through 16–48 to restore them to an operational condition.

16–45. Engine. a. If engine has been preserved, depreserve in accordance with TM 55-405-5.

b. If engine was not preserved, perform a complete runup in accordance with TM 55-1520-202-10.

16–46. Alighting Gear. Perform inspection in accordance with TM 55-1520-202-20 PMD.

16–47. Fuel System. a. Perform inspection of fuel system in accordance with TM 55-1520-202-20 PMD.

b. If fuel system was preserved, accomplish depreservation in accordance with TM 55-405-3.

16–48. Airframe. a. Remove all protective covers and shields.

b. Perform inspection in accordance with TM 55-1520-202-20 PMD.

16–49. Activation After Temporary Storage.

Helicopters returning to operation status after temporary storage must be depreserved in accordance with paragraphs 16–50 through 16–60 to restore them to operational condition.

16–50. Engine. Depreserve engine in accordance with TM 55-405-5.

16–51. Main Transmission (Main Gear Box) and Intermediate and Tail Gear Boxes. a. Remove barrier material from gear boxes and tape from gear box vents.

b. Remove corrosion preventive mixture.

c. Service gear boxes in accordance with figure 2–1.

d. Remove warning tags previously installed.

e. Clean all unprotected surfaces, shafts, etc with solvent (item 4, table 1–8) and dry using a clean, lint-free cloth.

16–52. Main Rotor Assembly. a. Unfold main rotor blades. Remove main blade folding rack.

b. Remove covering from main rotor assembly and main rotor blades.

c. Remove corrosion preventive compound with solvent (item 4, table 1–8) and dry using a clean, lint-free cloth.

Warning

Exercise extreme care that no solvent is permitted to come in contact with adjacent bonded areas of blades as this will weaken bond.

d. Lubricate main rotor assembly in accordance with lubrication chart (figure 2–1).

e. Service dampers and their reservoirs in accordance with paragraph 1–60. Secure bleeder and filler plugs.

16–53. Tail Rotor Assembly. a. Remove protective covers from tail rotor assembly and tail rotor blades.

b. Remove corrosion preventive compound from hub surfaces with solvent (item 4, table 1–8) and dry using a clean, lint-free cloth.

16–54. Electrical. a. Install battery in helicopter. (Refer to paragraph 12–73.)

b. Remove protective covering from electrical plugs and reinstall.

c. Remove barrier material and tape from electrical equipment.

d. Reinstall and check any electrical equipment removed.

16–55. Alighting Gear. a. Properly service and inflate landing gear shock struts. (Refer to paragraph 1–60.)

Note

Refer to servicing instructions on name plate attached to each shock struct (if helicopter is not blocked).

b. Inflate tires. (Refer to paragraph 1–60.)

16–56. Fuel System. Service the fuel system in accordance with paragraph 1–60.

16–57. Airframe. a. Remove all protective covers.

b. Perform an inspection in accordance with TM 55-1520-202-20 PMP.

16–58. Hydraulic System. Service the hydraulic system in accordance with paragraph 1–60.

16–59. Fire Extinguishers. Ensure fire extinguishers are in the helicopter in their proper locations and are in a fully charged condition.

16–60. Instruments. a. Remove pitot tube cover from pitot head.

b. Remove cover from pitot static port.

16–61. Activation After Limited Storage. Helicopters returning to operational status after limited storage must be depreserved in accordance with paragraphs 16–62 through 16–74 to restore them to operational condition.

16–62. Engine. Depreserve the engine in accordance with TM 55-405-5.

16–63. Main Transmission (Main Gear Box) and Intermediate and Tail Gear Boxes. a. Remove barrier material from gear boxes and tape from gear box vents.

b. Check to ensure main transmission (main gear box) and intermediate and tail gear boxes are properly lubricated. (Refer to paragraph 1–60.)

c. Remove warning tags from main transmission (main gear box) and intermediate and tail gear boxes.

16–64. Main Rotor Assembly. Accomplish procedures outlined in paragraph 16–52, steps *a* through *e.*

16–65. Tail Rotor Assembly. a. Remove covers from tail rotor blades and from tail rotor hub.

b. Clean corrosion preventive compound from all unprotected tail rotor hub surfaces with solvent (item 4, table 1–8).

c. Lubricate tail rotor assembly in accordance with figure 2–1. Purge all bearings.

16–66. Electrical. a. Unplug battery vent system.

b. Remove tape and barrier material from electrical equipment.

c. Remove barrier material from all loose electrical equipment.

d. Install battery in helicopter in accordance with paragraph 12–73.

16–67. Alighting Gear. Accomplish procedures outlined in paragraph 16–55.

16–68. Fuel System. Service the fuel system in accordance with paragraph 1–60.

16–69. Airframe. a. Remove all protective covers.

b. Perform an inspection in accordance with TM 55-1520-202-20 PMP.

16–70. Hydraulic System. Service the hydraulic system in accordance with paragraph 1–60.

16–71. Fire Extinguishers. Ensure fire extinguishers are in the helicopter in their proper location and are in a fully charged condition.

16–72. Instruments. a. Ensure pitot tube cover has been removed.

b. Ensure pitot static port is free of obstructions.

16–73. Avionic Equipment. a. Restore classified avionic equipment in the helicopter that has been previously removed in accordance with applicable directives.

b. Remove tape and barrier material from communications equipment or install equipment, if removed.

c. Clean corrosion preventive compound from exposed metal whip and mast antennas, and mechanical avionic items with solvent (item 4, table 1–8).

16–74. Flyaway Items. Replace flyaway items that were previously removed from the helicopter, including AN/CRT-3 radio set.

Section III Demolition

16–75. Demolition. When capture or abandonment of the helicopter to the enemy is imminent, the responsible unit commander must make the decision either to destroy the helicopter or render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. The care and handling of explosives are outlined in FM 5-25.

Caution

Do not destroy the helicopter except upon the orders of proper authority.

16–76. Destruction by Explosives. Place as many charges as the situation permits and detonate them simultaneously with detonating cord and a suitable detonator. Provide for dual methods of detonation to minimize the possibility of misfire.

Warning

Observe all appropriate safety precautions in FM 5-25.

a. Remove and empty portable fire extinguisher.

b. Puncture the fuel cells.

c. Break all radio equipment.

d. Prepare two 2-pound TNT charges with tetryl nonelectric caps and about 6 feet of safety fuse in each charge.

e. Place one charge on top of clutch housing.

f. Place one charge on engine as low down as possible.

g. Take cover and detonate TNT charges.

16–77. Destruction by Mechanical Means. a. Remove and empty portable fire extinguisher.

b. Drain all oil from the engines and break oil lines.

c. If engine will run, start engine and run until overheating causes it to stop.

d. Cut, break, or pull loose all electrical wires and cables.

e. With heavy blunt instrument (axe, sledge hammer, etc), break all radio and electronic equipment beyond repair or salvage.

f. With blunt instrument (axe, sledge hammer, etc), puncture fuel cells.

g. With blunt instrument (axe, sledge hammer, etc), destroy gear boxes, rotor blades, and engine.

h. Burn all papers.

Note

Repeat steps *b* and *c* for the auxiliary power unit.

16–78. Destruction by Fire. a. Remove and empty portable fire extinguisher.

b. Open fuel drain valves, puncture a fuel cell, or break a fuel line.

c. From a safe distance, ignite fuel.

Note

Fuel may be ignited from a safe distance by firing flares into the escaped fuel.

APPENDIX I

REFERENCES

AR 95-16	Weight and Balance, Army Aircraft
AR 310-1	General Policies
AR 310-3	Department of the Army Publications. Preparation, Coordination, and Approval
AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes
AR 385-40	Accident Reporting and Records
AR 750-5	Organization, Policies and Responsibilities for Maintenance Operation
DA PAM 310-1	Index of Administrative Publications
DA PAM 310-2	Index of Blank Forms
DA PAM 310-3	Index of Doctrinal, Training, and Organization Publications
DA PAM 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals, Supply Bulletins, Lubrication Orders, and Modification Work Orders
FM 5-25	Explosive and Demolition
TB AVN 2	Recommended Fuels, Engine and Transmission Oils for Army Aircraft
TB AVN 7	Painting and Marking of Army Aircraft
TB AVN 10	First Aid Kit, Airplane, Without Narcotics
TB AVN23-2	Use of Tricresyl Phosphate Concentrate (TCP) in Aviation Fuel
TB AVN 23-5-1	Equipment Improvement Recommendations Digest
TB AVN 23-8	Reporting Criteria and Instructions for Processing Damaged or Deteriorated Aircraft
TB AVN 23-10	Aircraft Accessory Replacement and Reuse Procedures
TB AVN 23-16	Test Flight and Maintenance Operational Checks for Army Aircraft
TB AVN 23-65	Aircraft Condition Components Requiring Historical Data
TB AVN 23-67	Army Aircraft Maintenance Inspection Procedures
TB AVN 25-8	Spark Plug Service and Maintenance Instructions and List of Approved Spark Plugs and Igniters for Army Aircraft
TM 1-42B-1-7	General Use of Aircraft and Electronic Lubricants
TM 1-42B1-1-1	Use and Disposition of Fuels
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination
TM 5-200	Camouflage Nets and Net Sets
TM 9-1375-200	Demolition Material
TM 9-4910-422-12	Operator and Organizational Maintenance Manual: Kit, Spark Plug Cleaning
TM 38-750	Army Equipment Record Procedures
TM 55-405-1	Army Aviation Maintenance Engineering Manual: General Practices
TM 55-405-2	Army Aviation Maintenance Engineering Manual: Aircraft Hardware and Materials
TM 55-405-3	Army Aviation Maintenance Engineering Manual: Maintenance of Aircraft Systems
TM 55-405-4	Army Aviation Maintenance Engineering Manual: Aircraft Structural Repair
TM 55-405-5	Army Aviation Maintenance Engineering Manual: Aircraft Engines
TM 55-405-6	Army Aviation Maintenance Engineering Manual: Aircraft Maintenance Tools
TM 55-405-7	Army Aviation Maintenance Engineering Manual: Shop Practices
TM 55-405-8	Army Aviation Maintenance Engineering Manual: Ground Support Equipment
TM 55-405-9	Army Aviation Maintenance Engineering Manual: Weight and Balance

TM 55-1520-202-ESC	Equipment Serviceability Criteria
TM 55-1520-202-10	Operator's Manual: Army Models CH-34A and CH-34C Helicopters
TM 55-1520-202-10CL	Operator's and Crewmember's Checklist: Army Models CH-34A and CH-34C Helicopters: Pilot's Checklist
TM 55-1520-202-20P	Organizational Maintenance Repair Parts and Special Tools Lists
TM 55-1520-202-20PMD	Preventive Maintenance Daily Inspection Checklist
TM 55-1520-202-20PMI	Preventive Maintenance Intermediate Inspection Checklist
TM 55-1520-202-20PMP	Preventive Maintenance Periodic Inspection Checklist

APPENDIX II

MAINTENANCE ALLOCATION CHART

AII–1. General. The maintenance allocation chart assigns maintenance functions to the lowest level of maintenance based on past experience and the following considerations.

a. Skills available.

b. Time required

c. Tools and test equipment required and/or available.

AII–2. Only the lowest level of maintenance authorized to perform a maintenance function is indicated.

AII–3. A maintenance function assigned a maintenance level will automatically be authorized to be performed at any higher maintenance level.

AII–4. A maintenance function which cannot be performed at the assigned level of maintenance for any reason becomes the responsibility of the next higher maintenance level.

AII–5. The assignment of a maintenance function will not be construed as authority to carry the associated repair parts in stock. Authority to requisition, stock, or otherwise secure necessary repair parts will be specified in the repair parts appendix.

AII–6. Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, maintenance functions assigned to a maintenance level may, on a one-time basis, and at the request of the lower maintenance level, be authorized specifically by the maintenance officer of the level of maintenance to which the function is assigned. The special tools, equipment, etc required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned.

AII–7. Organizational through depot maintenance of the U. S. Army Electronic Command Equipment will be performed by designated U. S. Army Electronic Command personnel.

AII–8. Changes in the maintenance allocation chart will be based on continuing evaluation and analysis by responsible technical personnel and on reports received from field activities.

AII–9. In any instance of conflict with current tool and equipment lists, or current supply manuals, this maintenance allocation chart will be the final authority.

AII–10. Definitions. *a. Service* — To clean, to preserve, and to replinish fuel, lubricants, hydraulic fluid, deicing fluid, oxygen, etc.

b. Adjust — To regulate periodically to prevent malfunction.

c. Align — To adjust two or more components of a system so their functions are properly synchronized.

d. Calibrate — To determine, check, or rectify the graduation of an instrument, weapon, or weapons system or components of a weapons system.

e. Inspect — To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

f. Test — To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

g. Maintenance Operational Check — Checks accomplished on the ground to ensure satisfactory operation of an item that has been replaced or adjusted.

h. Replace — To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

i. Repair — To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. The failure includes, but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

Note

As defined above, the functions of overhaul are not the same as for rebuild or repair.

j. Overhaul — To restore an item to completely serviceable condition as prescribed by serviceability standards developed and published by AVCOM. This is accomplished through employment of the technique of "Inspect and Repair only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

k. Rebuild — To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specification, and subsequent reassembly of the item.

l. Symbol X. The symbol X placed in the appropriate column indicates the level of maintenance responsible for performing the particular maintenance operation, but does not necessarily indicate that the repair parts

will be stocked at that level. Maintenance levels higher than the level of maintenance marked by an X are authorized to perform the indicated operation.

m. Symbol %%. The symbol %% which may be placed only in the O column indicates that organizational maintenance may perform the particular maintenance function provided the request originates from organizational level and is specifically authorized by the direct support technical service officer. The use of the symbol will be strictly limited and will apply only to replacement of major assemblies and time-consuming operations which are within the capabilities of organizational maintenance, but over which control by the technical service is considered essential. In no case will performance of a double percent function be directed by the direct support technical services officer, and in no case will a double percent function authorize stockage of parts at organizational level.

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
01	Airframe							
	Sheet metal (Interior and exterior) (Except Pylon)							
	Inspect		X					
	Repair (minor)		X					
	Structural repairs not requiring jig and fixture alignment			X				
	Structural repairs requiring jig and fixture alignment					X		
	Weight and balance			X				
	Windshields; sliding window and cabin door tracks, guides and stops							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace			X				
	Repair			X				
	Escape hatches; cockpit sliding windows and fixed windows; cargo hatch and cover							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Cabin door; clamshell doors, cowling, fairing and panels; cabin floor sections; and main rotor service platforms							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
01 (Cont)	Transmission deck; locks and latches; tail cone assembly; horizontal stabilizer; and pylon assembly							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace			X				
	Pylon, intermediate and tail gear box fittings, upper and lower hinge fittings, stabilizer fittings, tail rotor drive shaft disconnect coupling ring doubler							
	Inspect		X					
	Replace			X				
	Repair				X			
	Windshield wiper blades, converter and controls							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Windshield wiper motor and flexible drive							
	Inspect		X					
	Replace		X					
	Repair			X				
	Fuselage furnishings; seat belts and shoulder harness							
	Inspect		X					
	Test			X				
	Service		X					
	Replace		X					
	Repair			X				
	Inertia reels							
	Inspect		X					
	Replace		X					
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
01 (Cont)	Glare shields; soundproofing and console panels							
	Inspect		X					
	Replace		X					
	Repair			X				
	Vibration isolators							
	Inspect		X					
	Align		X					
	Replace		X					
	Personnel barrier							
	Inspect		X					
	Replace		X					
	Maintenance operation check		X					
	Repair			X				
02	Alighting Gear							
	Main landing gear assemblies							
	Inspect		X					
	Test			X				
	Service		X					
	Adjust			X				
	Replace			X				
	Repair			X				
	Overhaul				X			
	Tail landing gear assembly							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Tail wheel lock assembly							
	Inspect		X					
	Service		X					
	Align		X					
	Replace		X					

MAINTENANCE ALLOCATION CHART
FOR
CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
02 (Cont)	Wheel assemblies							
	Inspect		X					
	Replace		X					
	Repair			X				
	Tires; inner tubes; and wheel bearings							
	Inspect		X					
	Service		X					
	Replace		X					
	Wheel brakes and master cylinders							
	Inspect		X					
	Service		X					(Bleed)
	Replace		X					
	Repair			X				
	Overhaul				X			
	Static ground wire							
	Inspect		X					
	Adjust		X					
	Replace		X					
03	Engine							
	Engine assembly							
	Inspect		X					
	Test			X				
	Service		X					
	Replace			X				
	Repair			X				
	Overhaul					X		
	Cylinder and piston assemblies							
	Inspect		X					
	Test		X					(Compression)
	Replace			X				
	Overhaul					X		
	Air deflectors, baffles and exhaust collectors							
	Inspect		X					
	Replace		X					
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
03 (Cont)	Pushrods and pushrod housings							
	Inspect		X					
	Replace			X				
	Rocker box covers							
	Inspect		X					
	Replace		X					
	Intake and exhaust valves							
	Inspect			X				
	Adjust			X				
	Supercharger drain valve, air filters and screens							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Intake pipes							
	Inspect		X					
	Replace			X				
	Oil sump and plug							
	Inspect		X					
	Replace		X					
	Oil pumps, screen filter elements and magnetic plugs							
	Inspect		X					
	Service		X					
	Replace		X					
	Oil pressure relief valve							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Oil tanks							
	Inspect		X					
	Service		X					
	Replace			X				
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
03 (Cont)	Oil cooler assy							
	Inspect		X					
	Replace			X				
	Repair			X				
	Overhaul					X		
	Main thrust nut and oil seal							
	Inspect		X					
	Adjust			X				(Torque
	Replace			X				nut)
	Ignition harness							
	Inspect		X					
	Test			X				
	Replace			X				
	Repair			X				
	Spark plugs							
	Inspect		X					See TB
	Replace		X					AVN
	Service		X					25-8
	Adjust		X					Gap,
	Lord mounts, mounting ring and attaching parts							See TB AVN 25-8
	Inspect		X					
	Replace			X				
	Repair			X				
	Carburetor							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Automatic mixture control							
	Maintenance operation check		X					
	Repair			X				
	Replace			X				
	Engine driven fuel pump							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
03 (Cont)	Magneto							
	Inspect		X					
	Align		X					(Time)
	Replace		X					
	Repair			X				
	Overhaul				X			
	Starter							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Air intake ducts and diffuser							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Throttle synchronizer unit							
	Inspect		X					
	Service		X					
	Replace			X				
	Adjust			X				
	Align			X				
	Oil dilution system							
	Inspect		X					
	Replace		X					
	Repair			X				
	Induction vibrator and switches							
	Inspect		X					
	Replace		X					
	Repair			X				
	Primer solenoid							
	Inspect		X					
	Replace		X					
	Hydro-mechanical clutch assembly							
	Inspect		X					
	Service		X					
	Replace			X				
	Repair			X				
	Overhaul					X		

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
03 (Cont)	Clutch pump							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Diverter valve							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Engine cooling fan assembly							
	Inspect		X					
	Replace			X				
	Repair			X				
	Align			X				(Balance)
	Contravane							
	Inspect		X					
	Replace			X				
	Repair			X				
	Engine controls							
	Inspect		X					
	Maintenance operation check	X						
	Adjust			X				
	Align			X				(Complete rigging)
	Engine: Control cables, fairleads, bellcranks, quadrants, pulleys, push-pull rods and rod-end bearings							
	Inspect		X					
	Service			X				
	Replace			X				
04	Rotor and Transmission Systems							
	Main rotor blades							
	Inspect		X					
	Align		X					(Track)
	Replace		X					
	Repair			X				
	Overhaul					X		

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
04 (Cont)	Main rotor blade tip caps							
	Inspect		X					
	Replace		X					
	Repair			X				
	Main rotor head assembly							
	Inspect		X					
	Service		X					
	Replace			X				
	Repair			X				
	Overhaul					X		
	Pitch change control rod							
	Inspect		X					
	Adjust		X					
	Service		X					
	Replace		X					
	Star and scissors assemblies							
	Inspect		X					
	Service		X					
	Replace			X				
	Repair			X				
	Overhaul					X		
	Anti-flap and droop restrainers							
	Inspect		X					
	Replace		X					
	Repair			X				
	Main rotor dampers							
	Inspect		X					
	Service		X					
	Calibrate			X				
	Replace		X					
	Repair			X				
	Overhaul				X			
	Main, intermediate and tail rotor gear boxes							
	Inspect		X					
	Service		X					
	Replace			X				
	Repair			X				
	Overhaul				X			

MAINTENANCE ALLOCATION CHART
FOR
CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
04 (Cont)	Main gear box oil screen and main, intermediate and tail rotor gear boxes, magnetic sump plugs							
	Inspect		X					
	Replace		X					
	Main gear box oil pump							
	Inspect		X					
	Replace			X				
	Repair			X				
	Tail rotor assembly							
	Inspect		X					
	Service		X					
	Align			X				(Balance)
	Replace			X				
	Overhaul				X			
	Tail rotor blades							
	Inspect		X					
	Align		X					
	Replace			X				
	Repair			X				
	Tail rotor blade tip caps							
	Inspect		X					
	Replace			X				
	Repair			X				
	Drive shafts and rubber couplings							
	Inspect		X					
	Align			X				
	Replace			X				
	Repair			X				
	Drive shaft bearings							
	Inspect		X					
	Service		X					
	Replace			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
04 (Cont)	Disconnect coupling							
	Inspect			X				
	Service		X					
	Replace			X				
	Repair			X				
	Rotor brake							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Rotor brake master cylinder							
	Inspect		X					
	Service		X					(Bleed)
	Replace		X					
	Repair			X				
	Overhaul				X			
	Main gear box cooler							
	Inspect		X					
	Replace			X				
	Repair			X				
	Overhaul					X		
	Main gear box oil cooler blower assembly							
	Inspect		X					
	Replace			X				
	Repair			X				
	Main gear box oil cooler belts, lines and fittings							
	Inspect		X					
	Adjust		X					(Belt tension)
	Replace		X					
06	Hydraulic System							
	Pumps							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul					X		

MAINTENANCE ALLOCATION CHART
FOR
CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
06	Reservoirs							
	Inspect		X					
	Service		X					
	Replace			X				
	Repair			X				
	Filters							
	Inspect		X					
	Service		X					
	Replace		X					
	Valves (check manual)							
	Inspect		X					
	Service		X					
	Replace		X					
	Valves, (control, sequence, reducing, drain and relief)							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Valves (actuating, gate and solenoid)							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Hoses, lines and fittings							
	Inspect		X					
	Replace		X					
	Accumulators							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
08	Aircraft Instruments							
	Instrument panel							
	Inspect		X					
	Replace		X					
	Engine instruments							
	Inspect		X					
	Test				X			
	Adjust			X				
	Calibrate				X			
	Replace		X					
	Repair			X				
	Overhaul				X			
	Flight instruments (except those listed in Avionics MAC)							
	Inspect		X					
	Test				X			
	Adjust			X				
	Calibrate				X			
	Replace		X					
	Repair			X				
	Overhaul				X			
	Static pressure system							
	Inspect		X					
	Test			X				
	Service		X					
	Replace			X				
	Compass (standby only)							
	Inspect		X					
	Calibrate		X					
	Replace		X					
	Pressure transmitters and shockmounts							
	Inspect		X					
	Test			X				
	Replace		X					
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
08 (Cont)	Thermocouples, thermocouple leads and temperature bulbs							
	Inspect		X					
	Test			X				
	Replace		X					
	Instrument wiring, lines, plugs, connectors and fittings; switches, index and range markings							
	Inspect		X					
	Replace		X					
09	Electrical							
	Battery and jar							
	Inspect		X					
	Service		X					
	Replace		X					
	Voltage regulator							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Voltmeters							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Flasher unit, circuit breakers, fuses, switches and relays							
	Inspect		X					
	Replace		X					
	Wiring, conduits, connector plugs and junction boxes							
	Inspect		X					
	Replace			X				
	Landing light assembly and rotating beacon							
	Inspect		X					
	Replace		X					
	Repair		X					
	Overhaul			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
09	Interior lights							
	Inspect		X					
	Replace		X					
	Repair		X					
	Navigation lights							
	Inspect		X					
	Replace		X					
	Repair		X					
	Magnetic brake							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Tachometer generators							
	Inspect		X					
	Replace		X					
	Overhaul				X			
	Generator							
	Inspect		X					
	Maintenance operation check	X						
	Service		X					
	Repair (minor)		X					(Brushes only)
	Replace		X					
	Repair (major)			X				
	Overhaul				X			
	Generator blower							
	Inspect		X					
	Maintenance operation check	X						
	Replace			X				
	Repair			X				
10	Fuel System							
	Fuel cells							
	Inspect		X					
	Test			X				
	Service		X					
	Replace			X				
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
10 (Cont)	Transfer pumps							
	Inspect		X					
	Replace			X				
	Repair			X				
	Overhaul				X			
	Main fuel tank booster pump							
	Inspect		X					
	Test			X				
	Replace			X				
	Repair			X				
	Overhaul				X			
	Fuel screens, lines and hoses							
	Inspect		X					
	Service		X					
	Replace		X					
	Fuel valves							
	Inspect		X					
	Replace			X				
	Repair			X				
	Overhaul				X			
11	Flight Control System							
	Flight controls							
	Inspect		X					
	Maintenance operation check	X						
	Adjust			X				
	Align			X				(Complete rigging)
	Flight: control cables, fairleads, bell-cranks, quadrants, pulleys, push-pull rods and rod-end bearings; mixing tube and unit							
	Inspect		X					
	Service			X				
	Replace			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
11 (Cont)	Main rotor (primary), servo unit							
	Inspect		X					
	Service		X					
	Adjust			X				
	Replace			X				
	Repair			X				
	Overhaul				X			
	Auxiliary servo and tail rotor servo units							
	Inspect		X					
	Service		X					
	Adjust			X				
	Replace			X				
	Repair			X				
	Overhaul					X		
	Main rotor servo control arms							
	Inspect		X					
	Service		X					
	Adjust			X				
	Replace			X				
	Repair			X				
	Tail rotor pedal damper							
	Inspect		X					
	Replace		X					
	Repair			X				
12	Utility System							
	Heater and blower							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Heater fuel pump and motor assy and ignition unit							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
12 (Cont)	Heater ignitor plug, switches and relays							
	Inspect		X					
	Replace		X					
	Heater controls							
	Inspect		X					
	Replace		X					
	Repair			X				
	Heater fuel filter							
	Inspect		X					
	Service		X					
	Replace		X					
	Heater and defroster ducting							
	Inspect		X					
	Replace		X					
	Repair			X				
	Relief tube, horn and bracket							
	Inspect		X					
	Service		X					
	Replace		X					
17	Cargo and Personnel Handling							
	Rescue hoist system							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Rescue winch							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Cargo hook controls							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR CH-34 SERIES HELICOPTERS

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
17 (Cont)	Cargo hook							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Cargo sling							
	Inspect		X					
	Replace		X					
	Repair			X				
	Emergency alarm bell							
	Inspect		X					
	Replace		X					
	Litters, troop seats and supports							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
19	Avionics Equipment							
	Communication equipment							
	Navigation equipment							
	Intercommunication equipment							
	Inverters							
	Reconnaissance equipment							
	Electronic fuel gaging system installation							
	NOTE For all maintenance allocations and functions listed under avionics, refer to the maintenance allocation chart contained in TM 11-1520-202-20P.							

APPENDIX III

AIRCRAFT INVENTORY MASTER GUIDE

AIII–1. Introduction. Appendix III lists those items of installed or loose equipment required by and authorized for using organizations to accomplish their primary or alternate mission. This list will serve to standardize present inventory procedures, using the inventory master guide to determine the inventoriable items of installed and/or loose equipment. Insofar as possible, items of equipment are listed in the sequence of their physical location within the helicopter area.

AIII–2. Helicopter inventory is subject to change as a result of authorized changes (MWO's) and additions or delections of property for special missions requirements; therefore the selection of items of inventory from the inventory master guide may or may not provide a complete inventory list. When it is known that the master guide does not provide a complete inventory list, it will be necessary to research authorized changes (MWO's) and local command directives in order to compile an accurate and exact inventory list.

AIII–3. When the compilation of the inventory list is accomplished, this list will be entered on DA Form 2408-17, Aircraft Inventory Records. For preparation and use of this form, refer to TM 38-750.

AIII–4. Security. It is desired that aircraft inventory records be unclassified. Therefore, when equipment bearing a security classification or the installation of unclassified equipment is of a confidential or secret nature, accomplishment of the classification will be in accordance with existing security regulations.

AIII–5. Inventoriable Items. The selection of inventoriable items is without regard to the agency, governmental or contractual, furnishing the items.

a. Items to be listed are:

(1) Items essential to the execution of the designated mission of the helicopter, such as electronic, photographic, armament, special mission instruments, and safety and comfort equipment.

(2) Loose equipment delivered with the helicopter and items subject to pilferage or readily converted to personal use.

(3) Modification kits which are issued or distributed to using organizations for installation and which are not immediately placed in work will be recorded on the affected helicopter's DA Form 2408-17, Aircraft Inventory Record, and identified as loose equipment until modification is completed.

(4) Equipment required for operation in special environment.

b. Items to be excluded are:

(1) Nonaccountable items coded as expendable in the applicable stock lists.

(2) Personal issue or furnished on unit allowance or other authority.

(3) Items or components considered as basic or integral parts of the airframe or basic helicopter such as engines, propellers, wheels, and standard instruments.

(4) Technical publications, checklists, and aircraft forms.

AIII–6. Periods of Inventory. Inventoriable items will be checked against the Aircraft Inventory Record (DA Form 2408-17) at the following periods:

a. Upon receipt of the helicopter.

b. Prior to transfer of the helicopter to another organization.

c. Upon placing helicopter in storage and upon removing from storage. Helicopter need not be inventoried while in storage.

d. Twelve months elapsed time since last inventory.

e. Loose equipment shipped under separate cover are inventoried upon transfer by the sending activity and immediately upon receipt by the receiving activity.

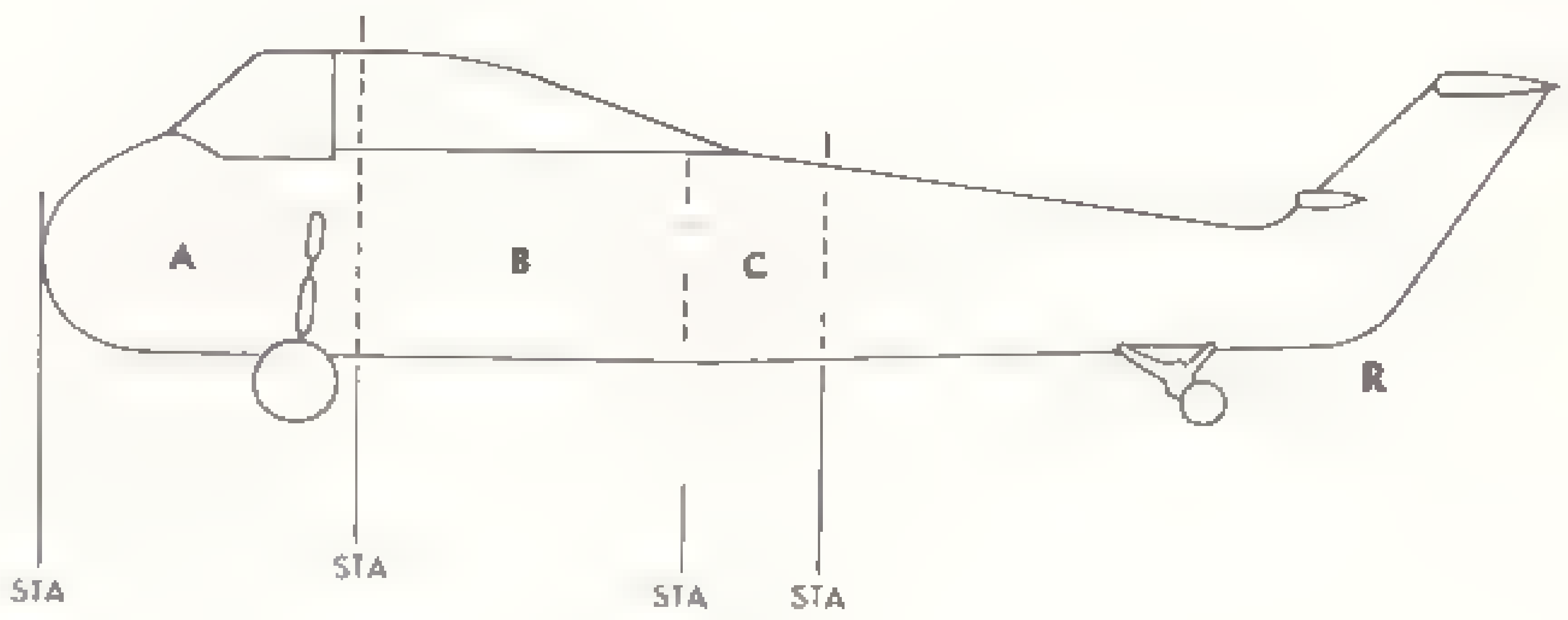
AIII–7. Inventory Items List.

A – CLUTCH AND COCKPIT COMPARTMENT
STA 00.0 TO 121.0 ON A AND C MODELS

B – CABIN COMPARTMENT
STA 121.0 TO 246 0 ON A AND C MODELS

C – ELECTRONICS COMPARTMENT
STA 246.0 TO 296.0 ON A AND C MODELS

R – ACCESSIBLE FROM OUTSIDE OF FUSELAGE



NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR HELICOPTER ARE TO BE LISTED ON DA FORM 2408 17, AIRCRAFT INVENTORY RECORD, FOR THE HELICOPTER

NOMENCLATURE	HELICOPTER SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED			LOCATION OR REMARKS
	CH-34A	CH-34C		
SECTION A – CLUTCH AND COCKPIT COMPARTMENT				
PILOT AND COPILOT SEAT CUSHIONS	2	2		
CLOCK 22322SET12	1	1		
RELIEF TUBE	1	1		
PILOT AND COPILOT BACK CUSHIONS	2	2		
PILOT AND COPILOT CORD ASSEMBLY	4	4		
SAFETY BELTS B-18	2	2		
DATA CASE AN8011-1A	1	1		
SHOULDER HARNESS G-1	2	2		
SPOTLIGHT	1	1		
ASH TRAYS	2	2		
FIRST AID KIT (WITHOUT NARCOTICS) 9-196-650	1	1		
FREE AIR THERMOMETER	1	1		
INVERTERS AN3533 1		2		
BATTERY AN3150-2 OR AN3151-2		1		
INERTIA REEL	2	2		
CONTROL PANEL SB-327/ARC-44	1	1		
MAGNETIC COMPASS J2	1	1		

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR HELICOPTER ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE HELICOPTER.	HELICOPTER SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED			LOCATION OR REMARKS
NOMENCLATURE	CH-34A	CH-34C		
SECTION A – CLUTCH AND COCKPIT COMPARTMENT (Cont)				
DISTRIBUTION PANEL SB-329/AR (ARC 44)		3		
INTERCOM C-1611/AIC		6		
SWITCH ASSEMBLY SA-474/ARA-31	1	1		
CONTROL C-1827/AR (ARC-55)	1	1		
CONTROL PANEL C-1341A/AR (ARC-12)	1			
CONTROL PANEL C-1342/ARC (ARC-12)	1	1		
CONTROL C-4074/ARC	1	1		
CONTROL C-1514/ARN-6	1	1		
INDICATOR ID-91/ARN	1	1		
CONTROL PANEL C-2275/ARN-59	1	1		
INDICATOR ID 637/ARN-59	1	1		
CONTROL C-984/ARN 30	1	1		
CONTROL C-3436/ARN-30	1	1		
CONTROL PANEL C 1254/ARN-30	1	1		
INDICATOR ID-453/ARN-30	1	1		
INDICATOR ID-48/ARN	1			
INDICATOR ID-322/ARN	1			
CONTROL C-3940/ARC-102		1		
CONTROL C-2174/ARX-44	1	1		
CONTROL C-808		1		
INDICATOR V-7A	1	1		
SECTION B – CABIN COMPARTMENT				
ANTIGLARE CURTAIN ASSEMBLY	1	1		
TROOP SEAT TWO MAN TYPE ACA 2092	1			
TROOP SEAT ASSEMBLY 1-1/2 MAN TYPE S1650-61390-2		1		
SAFETY BELTS FDC-1650-27	12	18		
HEADSET AND MICROPHONE H-101/U	1	1		
NETWORK IMPEDANCE CU-991/AR		1		
TROOP SEAT THREE MAN TYPE MIL-S-5804	3			
TROOP SEAT STEP ASSEMBLY S1650-61361		1		
FIRE EXTINGUISHER TYPE CF3BR	1	2		
CARGO DOOR SAFETY HARNESS S1J3817	1	1		
TROOP SEAT ONE MAN TYPE ACA 1141-21	1			
TROOP SEAT ASSEMBLY NINE MAN TYPE S1650-61390-1		1		
TROOP SEAT ASSEMBLY 4-1/2 MAN TYPE S1650-61390-3		1		
FIRST AID KIT (WITHOUT NARCOTICS) 9-196-650	2	2		
CARGO TIE DOWN DEVICES A1A	10	10		
LITTER STRAP ASSEMBLY S1650-61251-3	4	4		
LITTER BRACKET ASSEMBLY FDC 3835	4	4		

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR HELICOPTER ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE HELICOPTER.

NOMENCLATURE	HELICOPTER SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED			LOCATION OR REMARKS
	CH-34A	CH-34C		
SECTION B – CABIN COMPARTMENT (Cont)				
LITTER RETAINER CAPS	9	9		
HEATER DUCT (1000 FT.)	1	1		
BLIND FLYING PANEL ASSEMBLY S1650-62176-1	1	1		
CARGO SLING	1	1		WHEN NOT INSTALLED
PERSONNEL BARRIER	1	1		
BLIND FLYING PANEL ASSEMBLY S1650-62176-2	1	1		
BLIND FLYING PANEL ASSEMBLY S1650-62178-10				
BLIND FLYING PANEL ASSEMBLY S1650-62177-6	1	1		
BLIND FLYING PANEL ASSEMBLY S1650-62179-1	1	1		
BLADE STOWAGE ASSEMBLY S1670-10481-25	1	1		
BLADE TIP COVER	4	4		
ENGINE AIR EXIT COVER ASSEMBLY S1670-10491-2	1	1		
PITOT TUBE COVER ASSEMBLY S1670-10492-2	1	1		
MAIN ROTOR BLADE COVER ASSEMBLY S1670-10493-14	4	4		
MAIN ROTOR HUB COVER S1670-10494-2	1	1		
TAIL ROTOR BLADE COVER S1670-10495-2	4	4		
TRANSMISSION OIL COOLER COVER S1670-10496-2	1	1		
WINDSHIELD COVER S1670-10497-2	1	1		
TRANSMISSION SCREEN COVER ASSEMBLY S1670-10498-2	1	1		
TAIL ROTOR GEAR BOX COVER ASSEMBLY (UPPER) S1670-10499-20	1	1		
TAIL ROTOR HUB COVER ASSEMBLY S1670-10508-2	1	1		
LOWER PYLON COVER S1670-10510-2	1	1		
NOSE DOOR AIR EXIT COVER ASSEMBLY S1670-10504-2	1	1		
ENGINE EXHAUST COVER ASSEMBLY S1670-10632-7	1	1		
MAIN ROTOR BLADE CUFFS PIN PULLER S1570-10338-11	1	1		
ENGINE AIR EXIT COVER ASSEMBLY S1670-10633-13	1	1		
CRUTCH	1	1		
BLADE ROTATOR S1670-10051-1	1	1		
TOP EXHAUST PORT COVER ASSEMBLY S1670-10503-4	1	1		
BLADE-ASSIST POLE FORK	1	1		
AIRCRAFT TIE DOWN KIT AN8015-2	1	1		
SECTION C – ELECTRONICS COMPARTMENT				
RADIO COMPASS AN/ARN-6	1	1		
VHF MARKER BEACON RECEIVER AN/ARN-12	1	1		
DYNAMOTOR DY-107/AR (ARC44)	1	1		
KEYER KY-149/AR (ARA 31)	1	1		
MOUNTING MT1690/AR (ARA 31)	1	1		
AMPLIFIER AM609, ARN-30	1	1		
RECEIVER-TRANSMITTER RT-349 ARC-55B	1	1		
RECEIVER-TRANSMITTER RT-294/ARC-44	1	1		
BATTERY	1			
INVERTERS MS25093-1	2			
FM RADIO SET AN/ARC-44	1	1		

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR HELICOPTER ARE TO BE LISTED ON DA FORM 2408 17, AIRCRAFT INVENTORY RECORD, FOR THE HELICOPTER.

NOMENCLATURE	HELICOPTER SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED			LOCATION OR REMARKS
	CH-34A	CH-34C		
SECTION C – ELECTRONICS COMPARTMENT (Cont)				
MOUNTING MT-1268/AR (ARC 44)	1	1		
MOUNTING MT-1267/AR (DY-107)	1	1		
RADIO SET AN/ARC-55	1	1		
RECEIVER-TRANSMITTER RT-349/AR (ARC-55)	1	1		
MOUNTING MT-1536/AR (ARC-55)	1	1		
RECEIVER R-508/ARC (ARC-12)	1			
RECEIVER R-509 ARC (ARC-12)	1			
MOUNTING MT-1141 ARC	1	1		
RADIO TRANSMITTER T-366/ARC-12	1			
RADIO TRANSMITTER T-363/ARC (ARC-12)	2			
MOUNTING MT-1142 ARC	2			
RECEIVER R-511 ARC	1	1		
TRANSMITTER T-879 ARC-73	1	1		
RECEIVER R-1123 ARC-73	1	1		
MOUNTING MT-2699 ARC	1	1		
RECEIVER R-101 ARN-6	1	1		
MOUNTING MT-274/ARN-6	1	1		
RADIO RECEIVER R-836/ARN-59	1	1		
MOUNTING MT-2018/ARN	1	1		
DYNAMOTOR DY-150/ARN	1	1		
MOUNTING MT-2019/ARN	1	1		
RECEIVER R-122/ARN-12	1	1		
MOUNTING MT-589/ARN	1	1		
RADIO RECEIVER R-666A/ARN-32	1	1		
MOUNTING MT-1546/ARN	1	1		
RADIO RECEIVER R-445/ARN-30	1	1		
RECEIVER R-1021 ARN-30	1	1		
CONVERTER CV-217/ARN-30	1	1		
SIGNAL DATA CONVERTER CV-265/ARN-30A	1	1		
MOUNTING MT-1174/ARN-30	1	1		
MOUNTING MT-1175/ARN-30	1	1		
RECEIVER-TRANSMITTER RT-698/ARC-102		1		
STATIC INVERTER WITH MOUNT PP-3702/ARC-102		1		
MOUNTING MT-1719/ARC-102		1		
TRANSMITTER T-611 ASN	1	1		
COMPENSATOR CN-405 ASN	1	1		
AMPLIFIER A-2 (MIL-A-6589)	1	1		
CONTROL S-3B	1	1		
RECEIVER-TRANSMITTER RT-494/ARX-44	1	1		
MOUNTING MT-2100/ARX	1	1		
RADIO TRANSMITTER T-366/ARC		1		
MOUNTING MT-1142/ARC		1		
DYNAMOTOR DY-86/ARN-30		1		
POWER UNIT P-12		1		
AUTOMATIC PILOT AN/ASN-23		1		

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR HELICOPTER ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE HELICOPTER.	HELICOPTER SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED			LOCATION OR REMARKS
	CH-34A	CH-34C		
NOMENCLATURE				
SECTION R – ACCESSIBLE FROM OUTSIDE OF FUSELAGE				
CARGO SLING	1	1		WHEN INSTALLED
ANTENNA AT-454/ARC (ARC-44)	1	1		
ANTENNA MOUNT BASE AB-340/ARC-44	1	1		
ANTENNA AS-580/ARN-30	1	1		
ANTENNA AT-450/ARC-45	1	1		
ANTENNA AS-313A/ARN-6	1	1		
ANTENNA 37X-1 (ARN-12)	1	1		
STATIC GROUND WIRE 49R7572	1	1		
LANDING LIGHT 450W G6250-1	1	1		
ANTENNA AT-624A/ARA-31	4	4		
COUPLER CU-459/ARA-31	2	2		
ANTENNA AT-383/ARC-12	1			
ANTENNA AT-305/ARC-12	1			
LOOP ANTENNA AT-382	1	1		
ANTENNA AT-1108/ARC	1	1		
ANTENNA 37R-2 (ARC-73)	1	1		
LOOP ANTENNA AT-780/ARN-59	1	1		
ANTENNA AT-640/ARN	1	1		
SPLIT LOOP ANTENNA DMN-4-4/ARN-30	1	1		
ANTENNA AT-844/APX-44	1	1		

APPENDIX IV

WEIGHT AND BALANCE

For general weight and balance information, refer to TM 55-405-9, Army Aviation Maintenance Engineering Manual, Weight and Balance. Appendix II, Maintenance Allocation Chart, should be consulted for responsibility of weighing and balancing of the helicopter.

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